# Final Investigation Area H2 Remedial Action Plan

Prepared for

**Regulatory Agencies**

August 2004

Prepared by

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# Acronyms and Abbreviations

| | |
|---|---|
| ABM | abrasive blast material |
| AST | aboveground storage tank |
| bgs | below ground surface |
| BRAC | Base Realignment and Closure |
| BTEX | benzene, toluene, ethylbenzene, and xylene |
| CA/FO | Consent Agreement/Final Order |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CERFA | Community Environmental Response Facilitation Act |
| City | City of Vallejo, California |
| Consent Agreement | Consent Agreement between the DTSC, City of Vallejo, and Lennar Mare Island, dated April 16, 2001 |
| DTSC | State of California Environmental Protection Agency, Department of Toxic Substances Control |
| EBS | Environmental Baseline Survey |
| EETP | Eastern Early Transfer Parcel |
| FOPL | fuel-oil pipeline |
| FOSL | Finding of Suitability to Lease |
| G-RAM | general radioactive material |
| HHRA | human health risk assessment |
| IA | Investigation Area |
| IAS | initial assessment study |
| IT | IT Corporation |
| IR | Installation Restoration |
| IRP | Installation Restoration Program |
| IWPS | Industrial Wastewater Pump Station |
| IWTP | Industrial Wastewater Treatment Plant |
| LBP | lead-based paint |

| | |
|---|---|
| LMI | Lennar Mare Island |
| µg/100cm$^2$ | micrograms per 100 centimeters squared |
| µg/dL | micrograms per deciliter |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| MINS | Mare Island Naval Shipyard |
| msl | mean sea level |
| MTBE | methyl tert butyl ether |
| Navy | United States Department of the Navy |
| NFA | no further action |
| NNPP | Naval Nuclear Propulsion Program |
| PAH | polynuclear aromatic hydrocarbon |
| PA/SI | preliminary assessment/site inspection |
| PCB | polychlorinated biphenyl |
| PRC | PRC Environmental Management, Inc. |
| PRG | preliminary remediation goal |
| RAO | remedial action objective |
| RAP | remedial action plan |
| RASP | Radiological Affairs Support Program |
| RCRA | Resource Conservation and Recovery Act |
| RWQCB | Regional Water Quality Control Board, San Francisco Bay Region |
| SSPORTS | Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia, Environmental Detachment |
| SVOC | semivolatile organic compounds |
| SWMU | solid waste management unit |
| TPH | total petroleum hydrocarbons |
| TSCA | Toxic Substances Control Act |
| TtEMI | Tetra Tech EM, Inc. |
| USEPA | United States Environmental Protection Agency |

| | |
|---|---|
| UST | underground storage tank |
| UXO | unexploded ordnance |
| VOC | volatile organic compounds |
| Weston | Roy F. Weston, Inc. |
| XRF | X-ray fluorescence |

# DTSC DETERMINATION AND APPROVAL

The sites and environmental issues in IA H2 have either: (1) been investigated and considered not to represent a significant risk to human health or the environment, or (2) have planned remediation including land use covenants as specified in this RAP. In addition to implementation of this RAP for PCB and UST sites pursuant to Chapter 6.5 and 6.8 of Division 20 of the Health and Safety Code, the PCB and UST sites are concurrently being addressed by USEPA (for the PCB sites) and the RWQCB (for the UST sites), in accordance with the respective orders. The Investigation Area H2, Mare Island, Vallejo, California Final Remedial Action Plan is hereby approved.

Anthony J. Landis

8-19-04

Anthony J. Landis
OMF Branch Chief
California Environmental Protection Agency
Department of Toxic Substances Control

Date

# Executive Summary

CH2M HILL, under contract to Lennar Mare Island (LMI), prepared this remedial action plan (RAP) for Investigation Area (IA) H2 in accordance with the Consent Agreement (LMI et al. 2001) signed April 16, 2001, between LMI, the City of Vallejo, and the State of California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). The Draft RAP was circulated for public notice for 30 days and a public meeting was held on June 24, 2004. DTSC has reviewed and revised the document for consistency with State requirements and DTSC policy.

IA H2 is located in the central portion of the former Mare Island Naval Shipyard (MINS). IA H2 is approximately 14 acres bounded by light industrial areas to the north, by Walnut Avenue and light industrial storage to the east, by residential areas to the south, and by the San Pablo Bay wetlands to the west. Historically, facilities located within IA H2 were used for residential, storage, maintenance, and administrative activities. Based on the *Preliminary Land Use Plan* (LMI 2000), IA H2 is planned for recreational and medium- to high-density residential use.

This RAP documents that, within IA H2, environmental concerns have been identified and adequately investigated based on existing information. The RAP further documents that identified environmental concerns have been resolved or have planned remedial actions under the requirements of Chapter 6.5 and 6.8 of Division 20 of the Health and Safety Code, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Resource Conservation and Recovery Act (RCRA), and the Consent Agreement, or are being resolved under the requirements of other regulatory programs. Specifically, these other regulatory programs are the underground storage tank (UST) program, conducted pursuant to Regional Water Quality Control Board (RWQCB) Order R2-2002-0105 (RWQCB Order), and the polychlorinated biphenyl (PCB) program, conducted pursuant to the Consent Agreement and Final Order (CA/FO) between United States Environmental Protection Agency (USEPA) and the United States Department of the Navy (Navy), with the City of Vallejo and LMI as intervenors (USEPA et al. 2001).

The sites and environmental issues in IA H2 that have been identified and evaluated include:

- Three Installation Restoration (IR) Program sites (IR10, IR13, and a portion of IR14).
- Four PCB sites.
- Underground Storage Tank Program Sites.
- Unexploded Ordnance Program.
- Radiological Decommissioning Program.
- Abrasive Blast Material.
- Lead-based paint (LBP) in soil around existing structures built before 1978.

IR10, IR13, and the portion of IR14 within IA H2 have been investigated and remediated and are not considered to represent a significant risk to human health or the environment for their intended use. This RAP proposes that no further physical remediation activities

are necessary with respect to potential contamination within IR10 and IR13, and the remedy for these sites should include the recordation of a land-use covenant that restricts activities at IR10 and IR13 to those consistent with the recreational land use by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers. The land-use covenant will also include requirements for proper management of soil, periodic reporting, enforcement of restrictions, and reimbursement of DTSC costs associated with the administration of the restrictions. LMI will develop a land use restriction implementation and enforcement plan, approved by DTSC, prior to execution of the land-use covenant and certification by DTSC. This RAP also proposes that no further action (NFA) is required for two PCBs sites in IA H2 and identifies proposed remedies for: (1) two PCB sites where a release to the environment has occurred; (2) for structures within IA H2 that require remediation of lead in soil from LBP; and (3) additional sampling of residual solids and flushing of the IR14 industrial wastewater pipeline, if necessary, to remove residual solids from the pipeline to comply with the requirements of RCRA.

For completeness, this RAP also identifies UST and PCB sites in IA H2 that have been or are being resolved in accordance with the requirements presented in the RWQCB Order or the USEPA CA/FO, in addition to the requirements of Chapter 6.5 and 6.8 of Division 20 of the Health and Safety Code. This RAP has been prepared concurrently with ongoing work conducted at the UST and PCB sites, and this document references the specific reports that present detailed evaluations and closure requests. Consistent with the Consent Agreement, the completion of all removal actions at the UST sites, as well as submittal of the reports concluding that NFA is required at each of the sites, will be reviewed by DTSC prior to issuance of certification for IA H2. The above mentioned sites and issues are described below.

**Installation Restoration (IR) Program Sites**

IR10, a former outdoor PCB storage area, was characterized and remediated by the Navy through several investigations and removal actions. Surface contamination at IR10 (to approximately 9 inches below ground surface) was removed from the northeastern corner of the fenced storage area and disposed of off site. The *Final Investigation Area H2 Remedial Investigation Report* demonstrates that the existing level of constituents following the removal action are appropriate for the intended land use (CH2M HILL 2003a). Therefore, no further physical remediation activities are necessary for IR10. Because lead, polynuclear aromatic hydrocarbons, and PCBs are present in soil above levels consistent with unrestricted use, a land-use covenant consistent with recreational use is required for IR10.

IR13, a former electrical substation, was also characterized by the Navy through several investigations. The Navy completed several removal actions at the site and began their final removal action in 1999. CH2M HILL completed the remediation of the site by excavating additional soil in January 2003, transporting the soil (including soil from the Navy's final removal action) for off-site disposal, and backfilling the excavated areas with clean soil. The *Final Investigation Area H2 Remedial Investigation Report* demonstrates that the existing level of constituents following the removal actions are appropriate for the intended land use (CH2M HILL 2003a). Therefore, no further physical remediation activities are necessary for IR13. Because PCBs are present in soil above levels consistent with unrestricted use, a land-use covenant consistent with recreational use is required for IR13.

The land-use covenants necessary at IR10 and IR13 are pursuant to Section 67391.1 to Title 22, Division 4.5, Chapter 39 of the California Code of Regulations. Following agency review and approval of site closure with a land-use covenant, LMI will record the covenant, as appropriate, and provide a copy of the final recorded land-use covenant along with certification of recordation in Solano County.

IR14 within IA H2—the Industrial Wastewater Treatment Plant (IWTP) collection system piping and Industrial Waste Pump Station No. 1 (IWPS No. 1)—was characterized by the Navy during several investigations. The Navy removed sludge and residue and flushed the entire IWTP collection system in 1996. In August 2003, CH2M HILL initiated an interim removal action at the site to remediate subsurface soil contaminated with lead. IWPS No. 1 was removed during the removal action, and soil around the pump station was excavated. Approximately 490 cubic yards of soil were disposed of off site, and approximately 155 tons of concrete and rebar were crushed and recycled. A detailed evaluation for the site is presented in the *Draft Interim Removal Action Summary and Closure Report for IR14 and IWPS No. 1 in Investigation Area H2* (CH2M HILL 2004a). DTSC is reviewing this report for consistency with the final remedy identified in this RAP. In addition, in accordance with RCRA, the IR14 pipeline was inspected in April 2004 to assess if any waste remains in place (DTSC 2004a). Inspection of the pipeline by video survey revealed that the pipeline was intact and in good condition—no breaks were observed. However, solids were found intermittently in the pipeline. Therefore, the solids will be sampled, and additional flushing of the line will be performed, if necessary, to remove the solids from the pipeline to comply with the requirements of RCRA.

Groundwater monitoring is being performed for the IR sites within IA H2 to confirm the conclusions of the *Final Investigation Area H2 Remedial Investigation Report,* which determined that constituents in subsurface soil will not migrate into the groundwater at the sites that may discharge to the wetlands to the west (CH2M HILL 2003a). Groundwater samples will be collected over four quarterly groundwater monitoring events and analyzed for constituents of potential concern in soil at each IR site. The evaluation of the analytical results from the four groundwater monitoring events conducted at the IR sites within IA H2 will be presented in a future groundwater monitoring technical memorandum.

**Polychlorinated Biphenyls Program Sites**

Three PCB sites were identified inside and outside of Building 529 within IA H2. The Navy performed abatement activities, including concrete scabbling or washing, at each of the sites. DTSC and USEPA agreed that no further action was required for the machine shop floor inside the west end of the building (DTSC 2003a; USEPA 2004a). An additional PCB site was identified at the transformer pad west of Building 29. No PCBs were detected above laboratory reporting limits at this site. USEPA documented their determination that NFA is required at Building Q29 in a letter dated May 28, 2003 (USEPA 2003a). DTSC concurred that NFA is required at Building Q29 in a letter dated August 6, 2003 (DTSC 2003b). Therefore, no additional action is required for these two PCB sites.

CH2M HILL submitted a site-specific Cleanup Plan/Notification letter for the two PCB sites at Building 529 that require additional cleanup actions, in accordance with the Consent Agreement and the USEPA CA/FO (CH2M HILL 2003b). The Cleanup Plan proposed concrete and soil excavation to levels consistent with the proposed future residential land

use. DTSC approved this Cleanup Plan in a letter dated February 27, 2004 (DTSC 2004b). USEPA approved the planned action in a letter dated December 18, 2003 (USEPA 2003b). The removal action was initiated in May 2004. The results of the removal action, including the post-removal action risk assessment, will be presented in the *Implementation Report for Building 529 PCB Sites* (CH2M HILL pending(a)).

In accordance with the requirements of the CA/FO, an application for risk-based closure under the Toxic Substances Control Act (TSCA) was submitted to USEPA for IR10 and IR13 because PCBs are a constituent of potential concern at the sites (CH2M HILL 2003c). USEPA provided comments on this submittal in a letter dated March 9, 2004 (USEPA 2004b). CH2M HILL responded to these comments in April 2004 (CH2M HILL 2004b). NFA under TSCA was requested for the sites, and approval by USEPA is pending (USEPA pending).

**Underground Storage Tank Program Sites**

Four USTs associated with a former gas station were formerly located within IA H2. USTs 243-1 and 243-2 were initially installed outside Building 243. UST 231-1 and 231-2 were installed and connected to UST 243-1 and 243-2 by pipeline to increase the storage capacity of the gas station. The Navy removed UST 243-1 and 243-2 and the associated pipeline in December 1992. The Navy also removed UST 231-1 and 231-2 in October 1995. In 1999, the Navy performed a removal action to excavate contaminated soil in the area west of Building 231. CH2M HILL conducted additional soil and groundwater sampling to characterize the extent of contamination around the USTs and associated pipeline in August and September 2002 (CH2M HILL 2003d). Additional soil removal activities are proposed at the UST sites, as described in the *Site Characterization Report Addendum: Interim Remedial Action Work Plan Investigation Area H2 UST Sites* (CH2M HILL pending(b)). The results of these soil removal activities will be summarized in the *Implementation Report and Request for Closure for Investigation Area H2 UST Sites* (CH2M HILL pending(c)).

**Unexploded Ordnance Program**

The Navy addressed the nature and extent of potential unexploded ordnance contamination at the former MINS, and the supplemental environmental baseline surveys indicated that no existing ordnance concerns exist within IA H2. Neither live explosive ordnance nor ordnance ingredients were manufactured in any of the buildings or the surrounding area within IA H2. Additionally, none of the old rifle or firing ranges are located within IA H2 (PRC 1995a). No further investigation or response action is necessary within IA H2 to address environmental concerns related to unexploded ordnance.

**Radiological Decommissioning Program**

Based on comprehensive surveys of buildings and facilities in IA H2 under the Navy's radiological program, abatement activities (removal of contaminated materials) were performed as necessary, both inside and outside of IA H2 buildings. DTSC and USEPA agreed that no further investigation or response is necessary to address the areas of past radiological material use in IA H2 (DTSC 1996, 1997; USEPA 1996; MINS 1996a, 1997a).

**Abrasive Blast Material**

Abrasive blast material (ABM) was used periodically across Mare Island for utility pipeline bedding material and as excavation backfill. Based on inspections of Building 433, evidence

of an underground utility removal was apparent throughout the building, and approximately 20 cubic yards of ABM were present outside the southeast corner of the building. ABM removal and sampling activities were performed in accordance with the methods and procedures documented in the *Sampling and Analysis Plan for Abrasive Blast Material* (CH2M HILL 2003e). The ABM was removed and properly disposed of off site in February 2004, as documented in the *Technical Memorandum for ABM Removal at Building 433, Investigation Area H2* (CH2M HILL pending(d)). There are no other documented locations of spent ABM disposal within IA H2; therefore, no further investigation or response action is necessary to address environmental concerns related to ABM.

**Lead-Based Paint**

LBP was commonly used at MINS prior to 1978, when the use of LBP was discontinued. DTSC has determined that all structures older than 1978 with painted surfaces and unpaved surrounding areas should be characterized and remediated for lead in soil from LBP, as necessary (DTSC 2004a). The age of the buildings constructed in IA H2 allows the presumption that LBP may be present on all facilities except Buildings 1327 and 1331, which were built in 1987 (SSPORTS 1999a). Asphalt or concrete surrounds most structures in IA H2; however, landscaping surrounds many of the buildings located in areas planned for residential or recreational use. It is possible that degraded paint chips were released to the soil adjacent to these buildings. Therefore, additional characterization was performed for structures built before 1978 with painted surfaces and unpaved surrounding areas in IA H2. Specifically, Buildings 19, 21, 29, 29A, 29G, 131, 131A, and 913 were characterized in April 2004. As directed by DTSC, cleanup in areas planned for residential use is required if the average lead concentration on any side of the structure (i.e., the average of the drip-line and mid-yard sample on any side of the structure) is above 210 milligrams per kilogram (mg/kg), or if the maximum lead concentration for any sample is above 400 mg/kg. Based on the results of the soil characterization performed, a remedy is required for lead in soil surrounding all of the buildings listed above.

**Other Potential Sites**

Potential sources of environmental concern in IA H2, including the sanitary sewers, storm sewer system, oil/water separators, documented spills, hazardous waste accumulation areas, hazardous materials storage sites, and the past routine use of pesticides in IA H2 were evaluated in the *Final Investigation Area H2 Site Identification Technical Memorandum* and were not carried forward as sites of environmental concern (CH2M HILL 2002a). Therefore, no further investigation or action is required for these potential sources in IA H2.

Table ES-1 presents a summary of the proposed remedies for the sites in IA H2.

**TABLE ES-1**
Summary of Proposed Remedies for Sites in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Environmental Site | Proposed Remedy |
|---|---|
| IR10 and IR13 | Land-use covenant restricting use to recreational by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers. |
| IR14 (IWPS No.1) in IA H2 | Sample residual solids and flush from pipeline, if necessary, to comply with RCRA. |
| Building 529 UL#01 and Building Q29 AL#01 (inside machine shop floor and transformer pad) | No further action for unrestricted use. |
| Building 529 AL#01 and AL#02 (inside and outside Building 529) | Removal action for concrete and soil remediated to levels consistent with unrestricted use. |
| LBP – Buildings 19, 21, 29, 29A, 29G, 131, 131A, and 913 | Surface soil removal action to levels consistent with unrestricted use. |
| USTs 243-1, 243-2, 231-1, and 231-2 | Removal action for soil remediated to levels consistent with unrestricted use. |

# 1.0 Introduction

CH2M HILL prepared this remedial action plan (RAP) for Investigation Area (IA) H2 in accordance with the Consent Agreement (LMI et al. 2001) signed April 16, 2001 between Lennar Mare Island (LMI), the City of Vallejo (the City), and the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). The information in this RAP related to the identification of sites of environmental concern is consistent with the *Final Investigation Area H2 Site Identification Technical Memorandum*, dated May 9, 2002 (CH2M HILL 2002a)[1]. The remedial strategies for Installation Restoration (IR) sites IR10, IR13, and IR14 are consistent with the evaluation presented in the letter "Feasibility Study for Investigation Area H2, Mare Island, Vallejo, California," dated July 25, 2003 (CH2M HILL 2003f).[2]

Figure 1-1 shows the location of Mare Island and the former Mare Island Naval Shipyard (MINS). Figure 1-2 shows the LMI property subject to the Consent Agreement. IA H2 is located in the central portion of Mare Island. Historically, facilities located within IA H2 were used for residential, storage, maintenance, and administrative activities. Based on the *Preliminary Land Use Plan* (LMI 2000), IA H2 is planned for recreational and medium- to high-density residential use.

Previous environmental investigations conducted by the United States Department of the Navy (Navy) in IA H2 identified the potential presence of hazardous substances that require the preparation of a RAP and implementation of a remedy that complies with the National Contingency Plan. This RAP demonstrates that, within IA H2, the environmental concerns have been identified and either have been resolved or are planned for remediation under the requirements of Chapter 6.5 and 6.8 of Division 20 of the Health and Safety Code, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Resource Conservation and Recovery Act (RCRA), and the Consent Agreement, or are being resolved under the requirements of other regulatory programs. Specifically, these other regulatory programs are the underground storage tank (UST) program, conducted pursuant to Regional Water Quality Control Board (RWQCB) Order R2-2002-0105 (RWQCB Order), and the polychlorinated biphenyl (PCB) program, conducted pursuant to the Consent Agreement and Final Order (CA/FO) between United States Environmental Protection Agency (USEPA) and the Navy, with the City of Vallejo and LMI as intervenors (USEPA et al. 2001).

This RAP presents a summary of the previous environmental investigations, evaluations, and remedial actions conducted in IA H2 and describes the additional remedial actions planned for IA H2. This RAP also presents an evaluation of potential ecological and human health risks represented by residual levels of hazardous substances at IA H2. Additionally, this RAP includes the rationale for why no further physical remediation activities are

[1] DTSC accepted the results of this document, as confirmed in a January 10, 2003 letter (DTSC 2003c). The RWQCB accepted the results of this document, as confirmed in a January 8, 2003 letter (RWQCB 2003).

[2] DTSC accepted the results of this document, as confirmed in a September 24, 2003 letter (DTSC 2003d).

needed at IR10 and IR13 to be protective of human health and the environment for the planned land use of the sites. The remedy for these sites should include the recordation of a land-use covenant that restricts activities at IR10 and IR13 to those consistent with the recreational land use by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers. This RAP also proposes that no further action (NFA) is required for two PCBs sites in IA H2 and identifies proposed remedies for: (1) two PCB sites where a release to the environment has occurred; (2) for structures within IA H2 that require remediation of lead in soil from lead-based paint (LBP); and (3) additional sampling of residual solids and flushing of the IR14 industrial wastewater pipeline, if necessary, to remove residual solids from the pipeline to comply with the requirements of RCRA.

Section 1.0 presents a brief overview of the contents of this document. Section 2.0 presents the site location, general description, and physical site conditions. Section 3.0 presents a summary of environmental investigations conducted at the former MINS and presents findings of these investigations relative to IA H2. Section 4.0 presents the remedial action objectives for IR10, IR13, and IR14. Section 5.0 presents the rationale for why no further physical remedial activities are needed at specific sites to protect human health and the environment for the planned use of IA H2 and also describes the proposed remedies for sites which require further action. Section 6.0 presents the works cited during the preparation of this RAP.

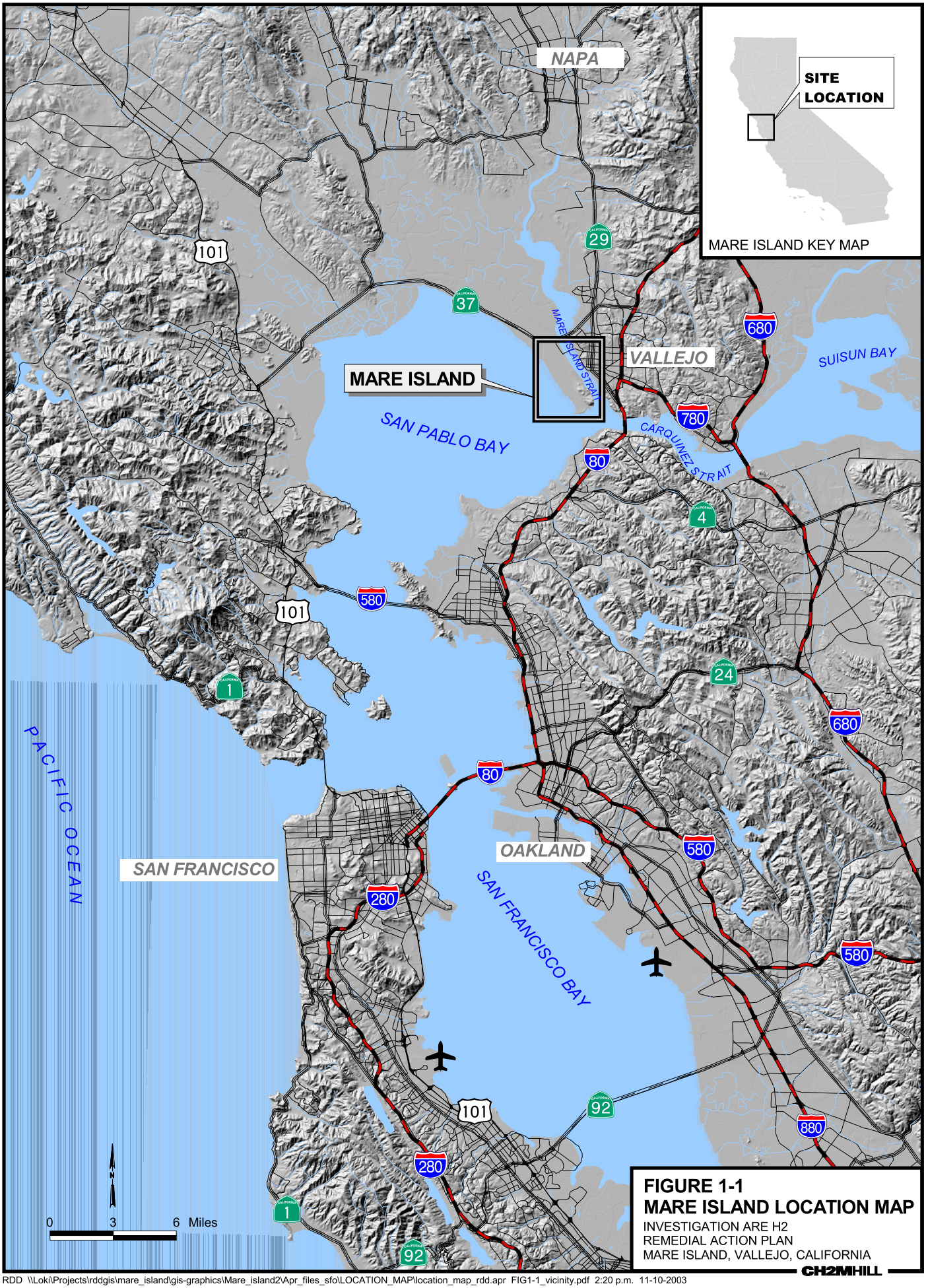


**FIGURE 1-1**
**MARE ISLAND LOCATION MAP**
INVESTIGATION ARE H2
REMEDIAL ACTION PLAN
MARE ISLAND, VALLEJO, CALIFORNIA

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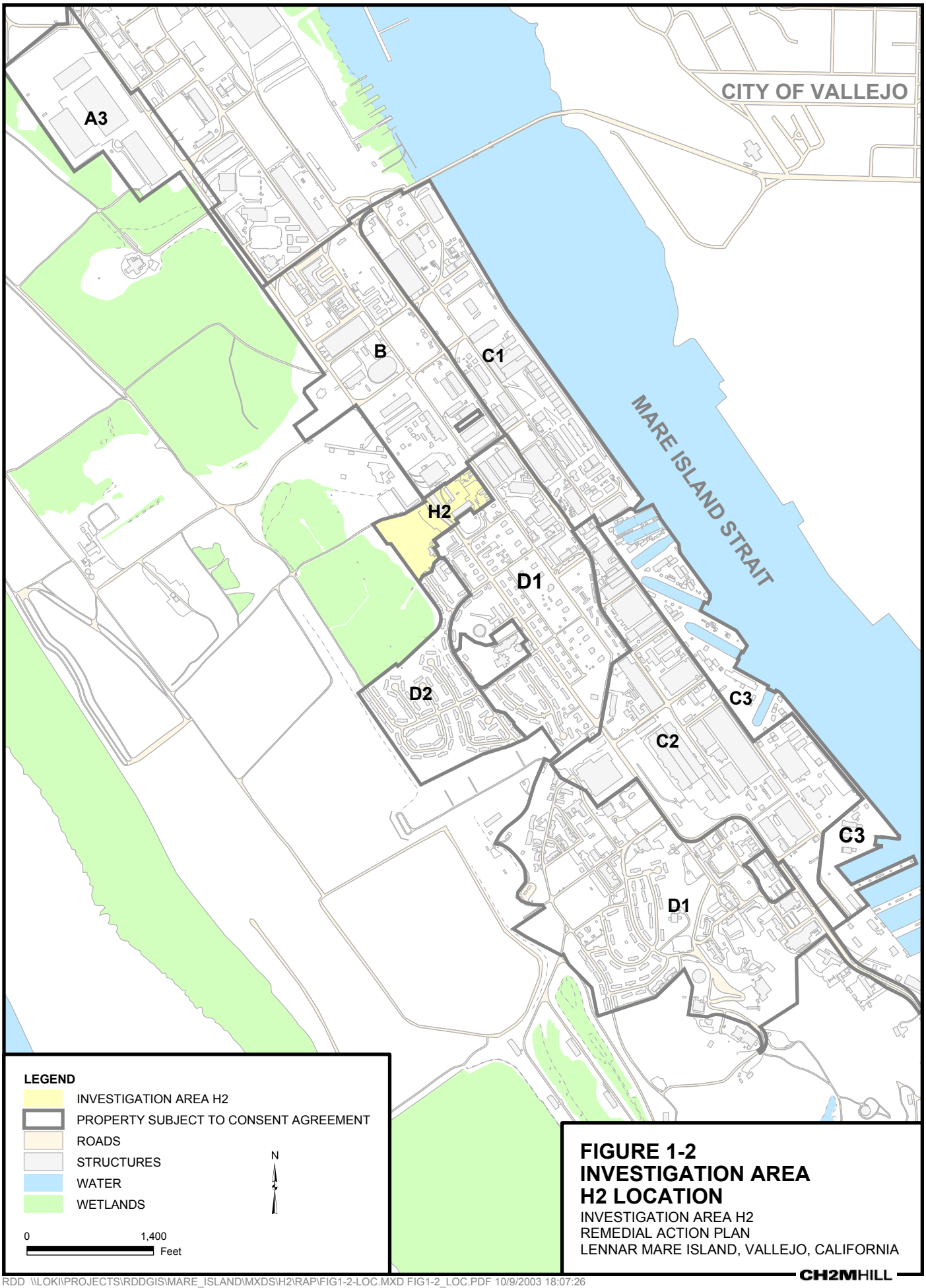


**FIGURE 1-2**
**INVESTIGATION AREA H2 LOCATION**
INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

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# 2.0 Background and Description

## 2.1 IA H2 Location and Description

The former MINS is located on Mare Island approximately 25 miles northeast of San Francisco, California, in Solano County on the western edge of the City of Vallejo (Figure 1-1). The island is currently a peninsula approximately 3.5 miles long and 1.25 miles wide (5,600 acres). Originally, Mare Island was a true island consisting of approximately 1,000 acres of dry land and 300 acres of wetlands off the shore of Vallejo, which was accessible only by ferry. The island was surrounded by low areas and tule marshes. In 1919, a wooden causeway with a drawbridge connected Mare Island to Vallejo. This wooden causeway was replaced in 1935 with the current concrete causeway.

The Navy purchased Mare Island in 1853 and commenced shipbuilding operations the following year. The primary ship construction and maintenance area of MINS was established along the northeastern shore of the original island adjacent to Mare Island Strait. In the early 1920s, the Navy initiated construction and maintenance of submarines at MINS. During World War II, MINS reached peak capacity for shipbuilding, repair, overhaul, and maintenance. Following the war, MINS was considered a primary station for construction and maintenance of the Navy's Pacific fleet of submarines. However, because of changing Navy needs, shipyard activity decreased. The former MINS was closed on April 1, 1996 after 142 years of operation.

IA H2 is located in the central portion of the former MINS. LMI, the City of Vallejo, and DTSC have divided the property subject to the Consent Agreement into eight IAs based on the Navy's previously-identified IAs, as modified to accommodate LMI's planned reuse and development schedule (Figure 1-2).

## 2.2 IA H2 Land-use History

IA H2 is approximately 14 acres bounded by light industrial areas to the north, by Walnut Avenue and light industrial storage to the east, by residential areas to the south, and by the San Pablo Bay wetlands to the west. The land surrounding IA H2 structures west of Azuar Drive is mostly unpaved. East of Azuar Drive, in the central portion of IA H2, the land is mostly paved, and land surrounding structures in the eastern portion is mostly landscaped. Figure 2-1 is an aerial photo showing the 15 current structures and the paved and vegetated areas in IA H2. Historically, facilities located within IA H2 were used for residential, storage, maintenance, and administrative activities. Based on the *Preliminary Land Use Plan* (LMI 2000), IA H2 is planned for recreational and medium- to high-density residential use (Figure 3-1). The western portion of IA H2, including IR10 and IR13, is intended for recreational use. A baseball and soccer field will be constructed on the site, similar to the current Morton Field located at G Street and Railroad Avenue (Moore 2002). The area occupied by IR14 is planned for residential use.

IA H2 was first developed in the late 1890s with the construction of nine officers' quarters and garages (Buildings 19, 21, 23, 25, 29, 29A, 29G, 131, and 131A). Storage and repair facilities and a radio station were added between 1918 and 1943 (SSPORTS 1996, 1999a). Building 913, originally built as a garage in 1964, was later converted to a chaplain's study quarter and subsequently has been used for storage. An industrial waste pump station (Building 971) was built in 1975. Two additional structures were added in 1987, including Building 1327 (car wash) and Building 1331 (crane maintenance facility). Two of the original residential structures, Buildings 23 and 25, were deconstructed in 1956 and 1948, respectively (SSPORTS 1996, 1999a). Building 243, a former garage/gasoline station was also demolished. Table 2-1 summarizes the use of buildings within IA H2.

**TABLE 2-1**
Summary of Building Use in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Building | Building Description | Year Built | Year Deconstructed |
|---|---|---|---|
| 19 | Officers' Quarters | 1898 | |
| 21 | Officers' Quarters | 1898 | |
| 23 | Civilian Quarters | 1903 | 1956 |
| 25 | Civilian Quarters | 1866 | 1948 |
| 29 | Officers' Quarters | 1897 | |
| 29A | Garage | 1933 | |
| 29G | Garage | 1932 | |
| Q29 | Concrete Pad | 1933 | |
| 131 | Officers' Quarters | 1899 | |
| 131A | Garage | 1920 | |
| 231 | Transportation Building/Gas Station - Shipyard | 1918 | |
| 243 | Former Garage/Gas Station | Circa 1935 | 1992 |
| 433 | Former Navy Low-frequency Transmitting Radio Station (brick building subsequently used for storage) | 1922 | |
| 529 | Storage | 1942 | |
| 531 | Shop – Vehicle Repair | 1942 | |
| 913 | Chaplin Study Quarters | 1964 | |
| 971 | Industrial Waste Pump Station #1 | 1975 | 2003 |
| 1327 | Car Wash – Walls Only | 1987 | |
| 1331 | Crane Maintenance | 1987 | |

Source: SSPORTS 1996, 1999a.

# 2.3 IA H2 Physical Characteristics

## 2.3.1 Topography/Hydrology

IA H2 occupies approximately 14 acres in the central portion of Mare Island. Approximately half of IA H2 is located outside the boundaries of the original island, in the area created by placement of imported fill materials. The topography is generally flat, with elevation approximately 12 to 20 feet above mean sea level (msl). The area consists of both paved and unpaved surfaces.

Surface water drainage within IA H2 is controlled primarily by the stormwater system that directs surface flow to the west toward the San Pablo Bay wetlands. Because of the relatively flat topography and the silty clay and clay loam surface soils, unpaved areas of IA H2 are subject to surface ponding. In the paved areas, during precipitation events, stormwater flows predominantly as sheet runoff to roadside ditches, or to the storm drain system.

IR10 is mostly unpaved and relatively flat, with a gentle slope from south to north having surface elevations ranging from about 12 to 17 feet above msl. IR13 is also mostly unpaved and gently slopes from the southeast to the northwest at surface elevations ranging from 18 to 20 feet msl. A fence and warning signs have been placed around the IR13 for safety. IR14 is an underground pipeline underneath Azuar Drive, along with associated pump stations. Industrial Wastewater Pump Station Number 1 (IWPS No. 1) was a subgrade pump station previously enclosed inside a fence surrounded by asphalt pavement. The pump station and fence were removed during the removal action in 2003.

## 2.3.2 Geology

Three geologic units were identified in IA H2. These are, from top to bottom stratigraphically: (1) artificial fill material, (2) unconsolidated natural deposits, and (3) bedrock. The artificial fill material is a heterogeneous unit consisting of clay, silt, sand, gravel, cobbles, and debris in varying proportions. The natural deposits consist of silty clay with organics that represent a marshy depositional environment likely part of the Younger Bay Mud. The bedrock at IA H2 consists of yellowish-brown sand and yellowish-to-grayish-brown silt with some clay. A description of the geologic units found at each of the IR sites is given below.

Two geologic units have been identified at IR10. These are, from top to bottom stratigraphically: (1) unconsolidated heterogeneous materials (i.e., artificial fill) and (2) unconsolidated homogenous materials (i.e., natural deposits). The unconsolidated heterogeneous materials unit is mainly dredge spoils consisting primarily of silt, with gravel, clay, and sand in lesser amounts throughout the site. The unconsolidated homogenous unit underlying the unconsolidated heterogeneous material is composed predominantly of naturally-deposited olive-gray to dark-gray silty clay, with minor occasional organic material such as trace roots, wood, and decayed plant matter.

In contrast, the geology of IR13 is predominated by artificial fill. Three geologic units have been identified at IR13. These are, from top to bottom stratigraphically: (1) coarse-grained fill materials, (2) fine-grained fill materials, and (3) weathered bedrock. The coarse-grained fill material is a heterogeneous unit consisting of silt, sand, gravel, and debris in varying

proportions. The fine-grained fill material is a fairly homogeneous unit consisting of silty clay, clay, minor gravel, and debris in varying proportions. This fine-grained fill material is considered to represent dredge spoils from the Navy's dredge pond filling activities overlying natural marshland depositional sediments. The weathered bedrock consists of poorly-lithified sand and silt, and it is difficult to distinguish the weathered bedrock from some of the materials that historically have been used as fill material at IR13. The weathered bedrock surface most likely represents the interface between the original Mare Island uplands and the fill materials that have been placed since 1912.

Two geologic units were identified at IR14. These are, from top to bottom stratigraphically: (1) artificial fill material and (2) unconsolidated natural deposits. The uppermost unit consists of artificial fill containing gravel, sand, and varying proportions of silt, clay, and debris. This heterogeneous artificial fill is underlain by a naturally-deposited silty clay.

In general, the industrial wastewater pipelines are buried 4 to 5 feet below ground surface (bgs), within the heterogeneous artificial fill material. The pipelines are typically located within coarser-grained trench backfill material. The trench backfill material for the IR14 pipeline and the pipelines leading to and from IWPS No. 1 is composed of silt, sand, and gravel. Lithologic logs from vacuum excavation and soil borings indicate that the backfill ranges in composition from predominantly homogeneous coarse-grained material (e.g., large gravel, pea gravel, and sand) to heterogeneous coarse- and fine-grained material (clay-silt-sand mixtures containing gravel, silt-sand-gravel mixtures, and silt, all of which may contain debris). The most frequently encountered IR14 backfill materials were gravel and silt-sand-gravel mixtures with debris.

### 2.3.3 Hydrogeology

One hydrogeologic unit, the shallow water-bearing zone, has been identified at IA H2. The shallow water-bearing zone refers to both the artificial fill and the upper silty clay that are intersected by the water table. The lower portion of the upper silty clay is a zone of lower hydraulic conductivity. IA H2 straddles the bedrock ridge, which trends north/south along the axis of the island. The relatively impermeable bedrock is thought to have a strong influence on groundwater flow in IA H2, resulting in a groundwater divide. Groundwater east of the groundwater divide travels toward Mare Island Strait, and groundwater west of the divide flows toward the wetlands to the west/southwest. The groundwater gradient in IA H2 varies spatially, ranging from 0.002 to 0.008 foot/foot.

Groundwater elevations measured from the two monitoring wells installed at IR10 in January 2004 were 11.09 feet above msl at IR10MW0100 in the northern central area of the site and 10.45 feet above msl at IR10MW0101 along the western boundary of the site, adjacent to the wetlands. The groundwater elevation measured from the monitoring well installed at IR13 in January 2004 (IR13MW0100) was 8.32 feet above msl. The groundwater elevation measured from the monitoring well installed at IR14 in January 2004 (IR14MW0100) was 12.41 feet above msl.

### 2.3.4 Beneficial Uses of Groundwater

As presented in the *Draft Assessment of the MUN Beneficial Use Designation for the Eastern Early Transfer Parcel Technical Memorandum* (CH2M HILL 2003g), groundwater within IA H2 is not considered a potential source of drinking water.

The technical memorandum, *Assessment of Beneficial Uses of Groundwater,* evaluated the suitability of Mare Island groundwater with respect to potential beneficial uses of industrial and agricultural supply and freshwater replenishment (PRC 1997a). Based upon the comparison of chemical data from individual wells at Mare Island against agricultural and industrial supply water quality criteria and the quantity of groundwater potentially available for supply, the memorandum concluded that the groundwater at Mare Island is unsuitable for industrial and agricultural purposes.

Groundwater at IA H2 flows toward regionally-significant wetlands that are located west of the site. Wetland C is part of the regionally-significant wetlands at Mare Island, as identified in the California Regional Water Quality Control Board *San Francisco Bay Basin Water Quality Control Plan* (RWQCB 1995), with designated beneficial uses as Estuarine Habitat, Non-contact Water Recreation, and Wildlife Habitat. Therefore, the groundwater at IA H2 has a beneficial use of replenishment to the adjacent wetlands area.

In conclusion, groundwater in IA H2 is not suitable, or potentially suitable, for the beneficial use as a supply for municipal or domestic water, industrial supply, or agricultural supply. The only beneficial use for groundwater at IA H2 is freshwater replenishment to the adjacent wetlands area.

### 2.3.5 Ecological Features

The land within the eastern portions of IA H2 is highly disturbed and is primarily covered by buildings and paved surfaces with minimal vegetation and no viable habitat. The land within the western portions of IA H2 consists of marginal upland habitat largely composed of fill material covered with shrubs and grasses. Both native and exotic plants are present in the upland habitat. Ecological receptors likely to use the upland habitat are invertebrates, amphibians, reptiles, birds, and mammals. Predominant bird species in the upland habitat include the California quail, red-tailed hawk (wintering), great blue heron, northern harrier, white-tailed kite, American kestrel, merlin, mourning dove, and Brewer's blackbird. Common upland habitat mammals include shrews, California ground squirrels, California voles, and blacktailed jackrabbits. Large mammal species include coyote, black-tail deer, and gray fox.

Immediately to the west of IA H2 are non-tidal wetlands and terrestrial habitats dominated by ruderal vegetation. Most of the non-tidal wetlands near IA H2 are former tidal wetlands that have been altered by the construction of levees and berms. The non-tidal wetlands near IA H2 are primarily vegetated with pickleweed and other wetland plants and provide good habitat for wetland species. Ecological receptors likely to use the non-tidal wetland habitats are invertebrates, amphibians, reptiles, birds, and mammals, including the endangered salt marsh harvest mouse.


**LEGEND**

- MONITORING WELL
- INVESTIGATION AREA
- GROUP I SITES
- GROUP II, III SITES
- ROADS

NOTES:
1. AERIAL PHOTO YEAR - 2000

0 150 Feet

N

**FIGURE 2-1**
**INVESTIGATION AREA H2**
**SITE MAP**
INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\MARE_ISLAND\MXDS\H2\RAP\FIG2-1_AERIAL.MXD FIG2-1_AERIAL.PDF 06/08/2004 13:39:58

# 3.0 Environmental Investigations and Removal Actions in IA H2

Environmental conditions at the former MINS were evaluated by a number of environmental programs and investigations aimed at identifying potentially-contaminated areas, characterizing soil and groundwater conditions, implementing corrective action activities, and maintaining environmental compliance programs. The environmental programs at MINS were executed over a period of many years, with oversight by USEPA, DTSC, and the RWQCB, San Francisco Bay Region.

Section 3.1 presents an overview of the various environmental programs and investigations, and Section 3.2 discusses the specific findings of those programs and investigations that identified, evaluated, and addressed environmental concerns in IA H2.

## 3.1 Environmental Programs

### 3.1.1 Installation Restoration Program

The Navy initiated an Installation Restoration Program (IRP) at Mare Island in 1981. The purpose of the IRP was to evaluate public health and environmental risks associated with MINS' historical operations and waste disposal activities. The IRP work performed over the past 20 years has consisted of preliminary assessments to identify sites of environmental concern, remedial investigations, feasibility studies, and removal actions. This work was performed in multiple phases by multiple contractors. Primarily because of the sequencing of the phases of work, the environmental sites were subclassified as either Group I or Group II/III sites.

#### 3.1.1.1 Group I Sites

The Group I IRP sites were identified through basewide reviews of historical operations at the MINS in the initial assessment study (IAS) and subsequent studies. The purpose of the IAS was to identify environmental contamination resulting from past hazardous materials operations at the former MINS through the evaluation of personal interviews, field inspections, and reviews of historical records and aerial photographs (Ecology and Environment, Inc. 1983). The IAS, completed in 1983, identified 14 potentially-contaminated sites. A subsequent verification study was completed in January 1987 that included the collection of environmental samples. The results of the verification study indicated that additional site characterization was necessary at all study sites (Richesin/SCS 1987). Subsequently, additional sites were identified by the Navy and regulatory agencies to bring the total of Group I sites included in the IRP to 24. The Group I sites were originally subdivided into three operable units for the purposes of the remedial investigation. Phase I of the remedial investigation—the site characterization summary—was conducted between 1990 and 1992 (IT 1992). The Phase I remedial investigation included collecting environmental samples at 19 Group I IRP sites, with the remaining five sites addressed

separately. Phase II of the remedial investigation occurred between 1993 and 1996 and included additional environmental sampling at all of the Group I sites.

Of the 24 Group I sites, only 17 are located within the property subject to the Consent Agreement, and three sites (IR10, IR13, and IR14) are located within IA H2. The three Group I sites identified in IA H2 are discussed in Section 3.2.1.

#### 3.1.1.2 Group II/III Sites

The Group II/III IRP sites were created from a number of other reports that documented environmental conditions at MINS. In 1987, the USEPA prepared a RCRA Facility Assessment Preliminary Review of solid waste management units (SWMUs), which included a record review of the former shipyard operations to identify previously-unregulated releases of hazardous constituents. The report documented 95 SWMUs, 11 potential SWMUs, and four areas of concern (Kearny 1987). The SWMUs, potential SWMUs, and areas of concern included shops associated with shipyard operations, USTs, previously-identified IRP sites, ordnance sites, radiological sites, and wastewater system conveyance and treatment structures and are considered Group II sites. An additional 19 sites were added by the regulatory agencies and the Restoration Advisory Board as uninvestigated areas of possible contamination. These 19 sites were identified as Group III sites.

The 129 sites were subject to further evaluation through preliminary assessment and site inspections (PA/SIs) and were divided into radiological sites, non-radiological sites, and ordnance sites. The PA/SI process involved employee interviews, site visits, historical records research, and sample collection at specified sites. A PA/SI final summary report for the non-radiological sites, completed in 1995, concluded that 24 of the 129 sites required further investigation under the Navy's IRP (PRC 1995b). Two of the 24 sites were eliminated after further discussions between the Navy and the regulatory agencies. The 22 sites for additional investigation were designated Group II/III sites and described in the *Group II and III Accelerated Study Field Sampling and Analysis Plan* (PRC 1997b). The Group II and III investigation occurred between 1997 and 1999.

Fourteen of the Group II/III sites are located within the property subject to the Consent Agreement, but none is located within IA H2.

### 3.1.2 UST and Fuel-oil Pipeline Programs

The UST program at Mare Island included the identification and removal of USTs and fuel-oil pipelines (FOPL) and performing abatement activities as necessary. Documentation of the UST site assessment, sampling, and abatement activities is contained in various reports, typically specific to certain UST sites. The Navy tasked the Supervisor of Shipbuilding, Conversion and Repair, Portsmouth, Virginia, Environmental Detachment (SSPORTS) to execute the UST removal activities and the removal and/or abandonment of the FOPL at Mare Island as part of base closure. When the organization SSPORTS was dissolved in September 1999, Roy F. Weston (Weston) was contracted to finish the FOPL remediation work.

During the years Mare Island was used as a shipyard, the Navy used numerous USTs. Some USTs at Mare Island date back to the early 1900s. These USTs were used primarily for

oil-fired, steam-driven machinery and to store heating oil for steam-heat boilers. Many of the USTs became obsolete as the central steam and natural gas systems replaced the need for oil burners. UST sites were identified through a review of available historical plans, drawings, written documentation, and visual surveys. According to the *Underground Storage Tank Summary Data Report, Revision I* (SSPORTS 1999b), there are 109 potential and known UST sites at Mare Island. The Navy states that 80 of these USTs have not been located (referred to as "suspect" UST sites); there was no evidence of these suspect USTs after site investigation (magnetic surveys, probes, and soft digs). Sixty-seven USTs have been removed, and five USTs have been closed in place. The Navy received closure letters from the RWQCB for 19 of the UST sites at Mare Island. CH2M HILL has received closure letters from the RWQCB for an additional 36 of the UST sites at Mare Island.

The FOPL distribution system was used to transport fuel oil across the former MINS between underground and aboveground storage tanks (ASTs), buildings, and work areas. Additionally, FOPL segments extended to the Mare Island Strait for conveyance of fuel oil between ships and the former MINS. The pipeline segments were generally abandoned in place when boilers were converted to natural gas or older buildings demolished; however, detailed records of the FOPL status were not maintained. FOPL segments were identified through a review of available historical plans, drawings, written documentation of previous investigations, and visual surveys. An estimated 51,000 linear feet of FOPL have been installed at MINS over a period of approximately 90 years. Approximately 49,000 feet of FOPL are located within the Eastern Early Transfer Parcel (EETP). The remaining 2,000 feet of FOPL are located outside of the EETP in the vicinity of Mare Island Elementary School and Building 1294 (CH2M HILL 2002b). CH2M HILL is completing a comprehensive program for identifying, investigating, and removing FOPL, as necessary, in the EETP.

The two UST sites in IA H2 are discussed in Section 3.2.2. There are no FOPL segments in IA H2.

### 3.1.3 PCB Program

The PCB program at MINS included identifying, retrofitting, and removing PCB-contaminated equipment, assessing locations of potential releases of PCBs, and performing abatement activities as necessary. Documentation of the PCB site assessment, sampling, and abatement activities is contained in the *Final Basewide Polychlorinated Biphenyl Confirmation Sampling Report* (TtEMI 1998).

From visual site surveys and the review of historical records, building closure reports, and databases of electrical equipment, transformers, and switches, the Navy identified more than 500 locations at the former MINS where PCB-containing equipment was located, where PCB spills were documented, or where contamination was suspected because of building history or visible stains. Navy personnel from SSPORTS conducted interim PCB assessments and performed abatement activities where necessary. Confirmation sampling was subsequently performed by Tetra Tech Environmental Management, Inc. (TtEMI) to confirm SSPORTS' findings whether abatement was necessary, or to determine the effectiveness and verify completion of the PCB abatement activities performed (TtEMI 1998).

The four PCB sites in IA H2 are discussed in Section 3.2.3.

### 3.1.4 Additional Investigation Programs (Unexploded Ordinance, Abrasive Blast Material, Radioactive Material, Groundwater Monitoring)

In addition to the IRP, UST, and PCB programs, other environmental programs were implemented at the former MINS that evaluated and identified other environmental concerns. These programs included surveys performed in accordance with the Community Environmental Response Facilitation Act (CERFA) in anticipation of base closure and real property transfer, as well as the ongoing environmental compliance programs at MINS, as presented in the *Final Investigation Area H2 Site Identification Technical Memorandum* (CH2M HILL 2002a).

CERFA requires the identification of contaminated and uncontaminated real property at Base Realignment and Closure (BRAC) properties. To meet the requirements of CERFA, the Navy began preparation of an Environmental Baseline Survey (EBS) in 1993 to document the existing environmental condition of real property at the former MINS. The EBS report is based upon information obtained through an extensive records search, personnel interviews, and visual site inspections of each building and facility conducted from August through December 1993 (MINS 1994). The reviewed records encompassed available Navy and regulatory agency records, which included environmental restoration and compliance reports, audits, permits, surveys, and inspections; current and historic aerial photographs; utility systems, drawings, and historical maps; and available recorded chain-of-title, deeds, and other real property records for the MINS. The survey was designed to identify, where possible, the potential for past and present site contamination by identifying the type, quantity, and instances of hazardous substance storage, release, or disposal.

Subsequent to the basewide EBS, the Navy prepared an *EBS Supplement for Zone 04 and Zone 06* (SSPORTS 1996, 1999a, respectively) that included the property in IA H2. These Supplemental EBSs were prepared to provide specific details of the environmental conditions of the properties within Zones 04 and 06[3]. The information for the various environmental restoration and compliance programs gathered for the original EBS was updated, and new record reviews and visual site inspections were conducted between January 1995 and April 1996 (SSPORTS 1999a). The Supplemental EBSs also included an assessment of the significant data collected for parcels adjacent to and contiguous to Zones 04 and 06 that could pose environmental concerns. Using the EBS, the BRAC Plan (MINS 1995a), the BRAC Cleanup Plan (MINS 1997b), the Supplemental EBSs, and the National Environmental Policy Act Categorical Exclusion for the Proposed Interim Lease, the Navy prepared a *Finding of Suitability to Lease* [FOSL]*) for Zone 06* (SSPORTS 1999c) and a *Lease Restriction Revision Form for Parcel 04-A* (Navy 1998). The purpose of the FOSL was to document environmental factors regarding the proposed lease of areas in the MINS. Properties identified in the FOSL documents as not suitable for immediate occupancy were subject to post-supplemental EBS surveys that included additional visual site inspections and updating information that addressed unresolved issues from the supplemental EBS, documented in lease restriction revisions.

[3] The former MINS was divided into zones according to anticipated future land use. Zone 04 was located in the central-eastern portion of the former MINS and included the southeastern portion of IA H2 and additional land to the south. Zone 06 was located in the central portion of the former MINS and included the majority of IA H2 and additional land to the south.

A BRAC Cleanup Team for MINS was formed with representatives from the Navy, DTSC, and USEPA. Consultation with the regulatory agencies was an integral part of the preparation of the FOSL and finding of suitability to transfer documents. Regulatory agency comments received during the development of the documents were reviewed and incorporated as appropriate. Throughout the CERFA documentation process (which occurred at approximately the same time that the PA/SI studies were completed and the scope of the Group II/III investigation was determined), the findings were reviewed by the Navy and the regulatory agencies to identify potentially-contaminated areas that may be appropriate for inclusion in the IRP as Group III sites. Furthermore, the CERFA documentation was reviewed to confirm the results of previous historical research at the former MINS and to identify sites for inclusion in the UST and PCB programs.

Environmental compliance programs and other basewide screening programs also evaluated the potential for site contamination at the former MINS. Surveys, investigations, and corrective actions were performed as appropriate for the following environmental compliance programs:

- Unexploded ordnance (UXO)
- Radioactive materials
- Basewide groundwater monitoring
- RCRA-permitted facilities

The first three of the above-listed programs were instituted basewide; the program findings in IA H2 are summarized in Sections 3.2.4, 3.2.5, and 3.2.6, respectively. No buildings or surrounding areas within IA H2 are identified as former RCRA-permitted facilities. The *Final Investigation Area H2 Site Identification Technical Memorandum* (CH2M HILL 2002a) concluded that the UXO, radioactive materials, and the basewide groundwater monitoring programs, as they related to IA H2, did not identify any sites that needed to be carried forward as sites of environmental concern.

In addition to the programs listed above, other potential sources of contamination were evaluated by environmental programs at the former MINS, including the following:

- Utilities (storm and sanitary sewer system)
- Spills
- Abrasive blast material (ABM)
- Hazardous waste management/hazardous materials management
- Lead in soil from LBP
- Oil/water separators
- Pesticides

The *Final Investigation Area H2 Site Identification Technical Memorandum* (CH2M HILL 2002a) concluded that these remaining potential sources of contamination in IA H2 do not need to be carried forward as sites of environmental concern. Regarding these potential sources of contamination, no further action is required in IA H2.

Since completion of the *Final Investigation Area H2 Site Identification Technical Memorandum*, a surface pile of ABM was discovered outside the southeast corner of Building 433 and disposed of off site, as discussed in Section 3.2.7. In addition, characterization and

evaluation of lead in soil from LBP has been performed, as discussed in Section 3.2.8 of this RAP.

# 3.2 Environmental Program Results in IA H2

This section presents the results of the various investigation programs conducted at the former MINS as they pertain to the identification, evaluation, and response action at environmental sites in IA H2.

## 3.2.1 Installation Restoration Program Sites

Three IRP environmental sites (IR10, IR13, and IR14) are located within IA H2. All three sites were originally identified as Group I sites. The locations of the IRP sites and the planned land uses are shown on Figure 3-1.

### 3.2.1.1 IR10

IR10 is a former outdoor PCB storage area located at the southwestern corner of the intersection of Azuar Drive and the access road south of Building 831. The site comprises approximately 4.2 acres, as shown on Figure 3-1. Transformers, rectifiers, switch gear, and other electrical equipment—some of which may have contained PCBs—were stored in a 0.5-acre fenced area in the center of the site (Navy 1980; Ecology and Environment 1983). The site was also used as part of a radio communications facility and for motor vehicle storage. The fence and equipment have been removed from the site, and no structures are currently present.

IR10 was used as part of a radio communications facility from at least the early 1920s until 1925 (Navy 1921, 1925). According to facility personnel, waste oil likely containing a mixture of total petroleum hydrocarbons (TPH)-diesel, TPH-motor-oil, PCBs, and metals was formerly applied to the gravel and silt soil surface for dust control (PRC 1994). In an aerial photograph taken in 1970, fill material appeared to have been recently placed in the southern area of IR10 (Navy 1970). This fill material overlies the gravel/silt layer to which the waste oil was likely applied.

In approximately 1972, a chain-link fence was constructed in the center of the site, enclosing the 0.5-acre PCB storage area. Storage of oil-filled electrical equipment potentially containing PCBs is believed to have commenced shortly after the fence was erected. In 1980, the Navy issued a work order to remove 30 pieces of the heavy electrical equipment that contained PCBs (transformers, rectifiers, and switch gear) from the fenced storage area and relocate them to an indoor storage area elsewhere on Mare Island (Navy 1980).

Review of a historical aerial photograph taken in 1988 showed that the fence had been removed. The site appears to have been used intermittently for storage and staging of equipment and materials from 1988 until base closure in 1996.

**Previous Investigations and Removal Actions at IR10.** The Navy conducted several studies and removal actions to characterize and address environmental contamination at IR10. Provided below is chronology of those studies and removal actions. As the removal actions at IR10 have been conducted based on PCB concentrations, Aroclor-1260 concentrations are discussed below and presented on Figure 3-2.

- In 1980, the Navy issued a work order to relocate 30 pieces of heavy electrical equipment filled with PCBs from the fenced storage area to an indoor storage facility (Navy 1980). Four soil samples were collected within the fenced area. The maximum concentration of Aroclor-1260, 1,220 milligrams per kilogram (mg/kg), was found in the northeast corner of the fenced area.

- Research for the 1983 IAS concluded that 200 cubic yards of soil at IR10 were affected with PCBs from leaking electrical equipment previously stored at the site. The IAS documented that removal of the contaminated soil was planned.

- During August 1983, based on elevated Aroclor-1260 concentrations detected as part of the 1980 work request, 12 additional soil samples were collected from within the northeast corner of the fenced storage area. Based on the sampling results, the Navy issued a work order to further investigate and remove PCB-contaminated soil from the fenced storage area (Navy 1983). In November 1983, the upper 3 inches of soil were removed in the vicinity of the two locations in the fenced storage area with greatest Aroclor-1260 concentrations. The approximate locations of this soil removal action are presented in Figure 3-2. These soils were disposed of off site (IT 1989). Additional soil samples were then collected from these two areas to assess residual PCB concentrations. Analyses indicated that PCBs remained in soil at elevated concentrations; therefore, removal of an additional 6 inches of soil was recommended. After the second removal action occurred, subsequent Navy documentation indicates that PCB concentrations in this area were below 0.16 mg/kg (Navy 1984), which is below the residential preliminary remediation goal (PRG) of 0.22 mg/kg[4].

- Between 1990 and 1992, Phase I of the remedial investigation was conducted to assess the extent of the PCB contamination in the soil (IT 1992). Five soil borings were installed inside the boundaries of the former fenced storage area, and one boring was located within the former soil removal area. Twenty soil samples were submitted to an off-site laboratory for analyses. The maximum concentration of PCBs detected was 0.35 mg/kg. The low maximum detection of PCBs suggests that soil containing the previously-detected elevated PCB concentrations had been removed during the 1983 removal action.

- During 1993 and 1994, the Phase II remedial investigation (PRC 1997c) was conducted to investigate the extent of PCBs and other constituents both inside and outside the former PCB storage area. Soil samples were collected from 55 direct-push borings from stained and odoriferous intervals, from below changes in the lithology, and from gravel layers that may have formed the original surface of the site before subsequent filling activities. Soil samples were submitted to on-site and off-site laboratories and analyzed for PCBs, volatile organic compounds (VOCs), semivolatile organic compounds (SVOC), TPH, pesticides, organotins, and metals. Grab groundwater samples were collected from eight boring locations within IR10 and submitted for analysis for VOCs, SVOCs, TPHs, pesticides, PCBs, and metals. The results of these samples are discussed in the *Final Investigation Area H2 Remedial Investigation* (CH2M HILL 2003a) and were included in the human health and ecological risk assessments discussed in the next sections.

[4] LMI's *Preliminary Land Use Plan* (LMI 2000) indicates that this site is designated for recreational land use. Comparison to the residential PRGs was considered as a conservative evaluation assumption.

- In October and December 2002, additional soil and groundwater sampling was performed in IR10 in response to agency comments on the *Draft Investigation Area H2 Remedial Investigation Report* (CH2M HILL 2002c). Seven soil samples, four groundwater samples, and one surface water sample were collected and analyzed for metals, TPH-diesel, TPH-motor-oil, organotins, PCBs, and/or lead. The results of these samples are discussed in the *Final Investigation Area H2 Remedial Investigation* (CH2M HILL 2003a) and were included in the human health and ecological risk assessments discussed in the next sections.

- CH2M HILL, on behalf of LMI, completed a *Final Investigation Area H2 Remedial Investigation* that included baseline risk assessments to evaluate risks to human health and the environment based on the post-removal action site conditions at IR10 (CH2M HILL 2003a). Data collected during the previous Navy and CH2M HILL investigations that were representative of post-removal action site conditions were used in the evaluation of site risks. Post-removal Aroclor-1260 concentrations are shown in Figure 3-2. The human health and ecological risk assessment results are discussed below. The DTSC accepted the results of the *Final Investigation Area H2 Remedial Investigation* in a letter dated September 24, 2003 (DTSC 2003d).

- In January 2004, two monitoring wells were installed at IR10 to satisfy DTSC's request for additional groundwater monitoring to confirm the conclusions of the *Final Investigation Area H2 Remedial Investigation Report*, which determined that constituents in subsurface soil will not migrate into the groundwater at the site that may discharge to the wetlands to the west (CH2M HILL 2003a). Monitoring well IR10MW0100 was installed in the northern central area of the site, and monitoring well IR10MW0101 was installed along the western boundary of the site, adjacent to the wetlands (Figure 3-1). Results from the January 2004 groundwater monitoring event indicated that no lead, PCBs, VOCs, PAHs, or TPH-motor-oil were detected above reporting limits. TPH-diesel was detected in IR10MW0100 at a concentration of 780 micrograms per liter (µg/L); however, none of the above constituents were detected above reporting limits in downgradient well IR10MW0101. The second groundwater monitoring event for IR10 was completed in April 2004. An evaluation of the analytical results from the groundwater monitoring events conducted at IR10 will be presented in a future groundwater monitoring technical memorandum.

**Human Health Risk Assessment for IR10.** The human health risk assessment (HHRA) evaluated the potential cancer risks and the potential for adverse health effects other than cancer from exposures to constituents remaining in soil at IR10 after the soil removal activities. The HHRA presented risk estimates based on reasonable maximum exposure assumptions. The site was evaluated according to its planned recreational land use. A baseball/soccer field is planned for this recreational area; therefore, potential risks from constituents at IR10 were determined for the future recreational youth. Based on the activities expected to occur in a recreational area, the HHRA assumes that the most plausible potential exposure for the baseball/soccer players would be to surface soil.

Because the groundwater at IA H2 does not meet the criteria for consideration as a potential drinking water source, migration of VOCs from groundwater through soil into indoor air was the only potential for exposure to constituents in groundwater considered in the HHRA

under the planned future land use. The analytical results from groundwater samples from all three IR sites within IA H2 were used for this evaluation.

The HHRA for IR10 presented four sets of risk estimates (total risk, site risk, incremental risk, and ambient risk). The different risk estimate types varied in their consideration of risks associated with ambient (background) levels of constituents and risks associated with site constituents. Site and incremental risk estimates represent the risks associated with the constituents of potential concern identified at IR10 and are the risk estimate types upon which remedial action decisions are based.

The HHRA estimated that future site conditions at IR10 pose potential site and incremental lifetime excess cancer risks of $2 \times 10^{-6}$. The site and incremental hazard indices, a measure of the potential for non-carcinogenic health effects, were between 0.003 and 0.007 for the future recreational youth. In addition, the estimated maximum blood-lead concentration for the future recreational youth is lower than the level of concern (10 micrograms per deciliter [µg/dL]). The exposure point concentration for lead was estimated to be 72 mg/kg, which is well below the residential risk-based levels for Mare Island (210 mg/kg, including the homegrown produce pathway and 370 mg/kg, excluding the homegrown produce pathway; Navy 2001)[5]. Furthermore, the evaluation of VOCs in groundwater determined that none of the maximum detected concentrations of VOCs exceeded conservative risk-based levels, indicating that the risks associated with this potential pathway are below the risk-management range.

Because the cumulative excess carcinogenic risk and the non-carcinogenic hazard indices were within the risk-management range (cumulative excess carcinogenic risk between $1 \times 10^{-4}$ and $1 \times 10^{-6}$ and a hazard index less than 1), and considering reasonable maximum exposure assumptions for the reasonably-anticipated future land use, additional response action at IR10 is not warranted to mitigate risks to human health. The HHRA was accepted by DTSC in letter dated June 23, 2003 (DTSC 2003e). The HHRA was also submitted to USEPA as an application for risk-based closure in compliance with the USEPA CA/FO. USEPA provided comments on this submittal in a letter dated March 9, 2004 (USEPA 2004b). CH2M HILL responded to these comments in April 2004 (CH2M HILL 2004b). USEPA approval of risk-based closure for PCB contamination at IR10 is pending (USEPA pending).

Because lead, polynuclear aromatic hydrocarbons (PAHs), and PCBs are present in soil above levels consistent with unrestricted use, a land-use covenant is required for IR10. The land-use covenant is pursuant to Section 67391.1 to Title 22, Division 4.5, Chapter 39 of the California Code of Regulations. Following agency review and approval of site closure with a land-use covenant, LMI will record the covenant, as appropriate, and provide a copy of the final recorded land-use covenant along with certification of recordation in Solano County.

**Ecological Risk Assessment for IR10.** A baseline ecological risk assessment was performed for IA H2 and the adjacent wetlands. This ecological risk assessment identifies the chemicals, habitats, receptors of concern, and potential ecological risks posed to those

[5] LMI's *Preliminary Land Use Plan* (LMI 2000) indicates that this site is designated for recreational land use. Comparison to the residential RBLs was considered as a conservative evaluation assumption.

receptors because of past or current land-use activities. IR10 and IR13 were evaluated together because the habitat and potential receptors are the same.

Potential ecological receptors within IR10 and IR13 include terrestrial wildlife species (invertebrates and vertebrates) and plants (including forage species). Potential ecological receptors in the wetlands include water-related wildlife species (invertebrates and vertebrates) and plants (forage species), as well as aquatic organisms (amphibians and invertebrates). Because the wetlands are seasonal, fish do not occur in the wetlands.

Constituents in soil, sediment, and groundwater were screened against various criteria and other potential effects levels in order to determine which constituents needed further evaluation. Risk estimates were performed by calculating hazard quotients for each representative species exposed to constituents in associated media. In addition to risk estimates, site-specific bioassay data using exposure media from IA H2 were reviewed from the Navy's *Final Onshore Ecological Risk Assessment, Mare Island* (TtEMI 2002).

Evaluation of terrestrial receptors in the uplands exposed to soils, including plants, invertebrates, and birds and mammals, suggests that risks are minimal. Risks to birds and mammals in the wetlands (outside of the boundary of IA H2 and IR10), as well as risks to aquatic life exposed to sediments at the wetlands, are considered low to negligible.

After quantitative and qualitative evaluation of risks within IA H2 (including IR10 outside of IA H2) and the adjacent wetlands, no further ecological investigation is necessary. The ecological risk assessment was accepted by DTSC in letter dated June 23, 2003 (DTSC 2003e).

#### 3.2.1.2 IR13

IR13 is located just south of IR10, slightly northwest of the intersection of Azuar Drive and 5th Street, as shown on Figure 3-1. IR13 includes the northwestern portion of Building 433, a former electrical substation, and adjacent paved and unpaved areas. The substation consisted of single-phase and three-phase transformers designed to meet the electrical demands of the radio equipment in the building. A diesel-powered generator was also installed in the substation for an emergency power supply.

Radio operations at Building 433 began in 1925 and ended in the early 1950s, when all of the radio equipment was removed. The building was then converted for storage of miscellaneous materials and equipment (Weston 2001).

In August 1981, an estimated 5 gallons of PCB-containing transformer oil reportedly leaked from a single transformer into the concrete trench and sump of the electrical substation, through the drain outlet in the sump, and into the clay drain pipeline to a former low-lying vegetated area approximately 50 feet northwest of Building 433 (see Figure 3-3). Some time after 1981, the low-lying area where the outfall had been located was subsequently filled with approximately 10 to 13 feet of sandy and clayey silt mixed with debris (MINS 1995b).

**Previous Investigations and Removal Actions at IR13.** The Navy and CH2M HILL conducted several studies and removal actions at IR13 to characterize and address environmental contamination at IR13. Provided below is a chronology of those studies and removal actions. As the removal actions at IR13 have been conducted based on PCB concentrations, Aroclor-1260 concentrations are discussed below and presented on Figure 3-3.

- In response to the spill in 1981, a Mare Island environmental response team excavated the visibly-stained soil from the outfall area and removed the drain pipeline. Eleven 55-gallon drums of contaminated soil from the low-lying area beneath the drain pipe outlet were excavated. After the cleanup, the substation sump drain outlet was sealed with concrete to prevent any further discharges.
- Research for the 1983 IAS concluded that a transformer leaked PCB-containing oil into the area behind Building 433, that the spill was cleaned up, and the transformer was removed from service.
- Between 1990 and 1992, Phase I of the remedial investigation was conducted at IR13 to assess whether elevated concentrations of PCBs remained beneath the fill in the former low-lying area northwest of Building 433 (IT 1992). The investigation consisted of drilling six borings in the approximate vicinity of the former drainpipe outlet to 15 feet bgs. Ten soil samples were analyzed for PCBs and pesticides. All samples contained less than 1 mg/kg PCBs (Weston 2001), with a maximum concentration of 0.26 mg/kg.
- During 1993 and 1994, the Phase II remedial investigation was conducted at IR13 to characterize the lateral and vertical extent of PCBs in soil and in aboveground structures of the electrical substation, particularly around the former drain pipeline. Two sediment and three concrete core samples were collected from the substation trench and sump. Forty-two GeoProbe® borings were installed, and 235 soil samples were collected and analyzed for PCBs, VOCs, SVOCs, TPH, pesticides, and metals. Grab groundwater samples were collected from three boring locations within IR13 and submitted for analysis for VOCs, SVOCs, TPHs, pesticides, PCBs, and metals. The results of these samples are discussed in the *Final Investigation Area H2 Remedial Investigation* (CH2M HILL 2003a) and were included in the human health and ecological risk assessments discussed in the next sections. The site was found to be still highly contaminated with PCBs up to 12,800 mg/kg (PRC 1997c) in the sediments within the substation concrete sump. At the outlet of the former drainpipe 50 feet northwest of Building 433, contamination ranged from 120 mg/kg to 8,600 mg/kg from 8 to 15 feet bgs.
- The findings of the Phase II remedial investigation led the Navy to initiate a removal action at IR13 in 1995. The cleanup goal was established at 1 mg/kg or less PCBs in soil. The 1995 removal action included demolition of the cinder-block wall enclosing the substation, removal of the substation concrete sump, removal of the transformer concrete pad, decontamination of Building 433 north wall, and excavation of 160 cubic yards of soil. The area of the excavation is shown in purple on Figure 3-3. Confirmation soil samples from the excavation revealed that elevated levels of PCBs were still present in the walls and bottom of the excavation. The removal action was postponed in December 1995, and the excavated area was covered with plastic sheeting.
- In August and September 1996, soil samples were collected from 11 borings located 5 feet and 10 feet away from the open excavation next to Building 433 and from three borings within the excavation. Various PCB concentrations were reported, and 3,300 mg/kg was the highest detection.

- In September 1997, the excavation at IR13 was continued to include the removal action areas shown in pink on Figure 3-3. Approximately 190 additional cubic yards of soil were excavated adjacent to Building 433 and disposed of off site. The excavation adjacent to Building 433 was restored in October 1998 by backfilling and grading to match the surroundings.
- In June 1999, soil excavation at the site began to extend toward the center of IR13, as shown in green on Figure 3-3, in the outfall area of the former discharge pipe. Four hundred and twenty-four cubic yards of soil were excavated from the area 50 feet northwest of Building 433. After excavation activities were complete, 30 confirmation samples were collected from the walls of the excavation. The majority of the results from these samples were less than 1 mg/kg. The Navy completed all site work in September 1999. The excavation was left open, and the site was secured by a locked chain-link fence. The Navy generated several soil piles during this removal action that were left on site. These piles were sampled for waste profiling and were disposed of by CH2M HILL in January 2003.
- In November 2002, additional groundwater sampling was performed in IR13 in response to agency comments on the *Draft Investigation Area H2 Remedial Investigation Report* (CH2M HILL 2002c). One groundwater sample was collected from the area adjacent to the highest soil concentrations of PCBs and was analyzed for PCBs. PCBs were detected at very low concentrations (0.15 µg/L).
- In December 2002 and January 2003, CH2M HILL completed the excavation of the area left open by the Navy in 1999. Two hundred twenty-five cubic yards were removed during the 2002/2003 excavation at IR13. The excavation was backfilled with clean soil on January 10, 2003. Including the soil piles generated by the Navy during the 1999 excavation, 600 cubic yards of soil were disposed of at a Class II landfill by the middle of January 2003. The maximum concentration of Aroclor-1260 detected at IR13 in the soil excavation area after the 2002/2003 removal action was completed was 0.12 mg/kg.
- CH2M HILL, on behalf of LMI, completed a *Final Investigation Area H2 Remedial Investigation Report* that included baseline risk assessments to evaluate risks to human health and the environment based on the post-removal action site conditions at IR13 (CH2M HILL 2003a). Data collected during the previous Navy and CH2M HILL investigations that were representative of post-removal action site conditions were used in the evaluation of site risks. Post-removal Aroclor-1260 concentrations are shown in Figure 3-3. The human health and ecological risk assessment results are discussed below. The DTSC accepted the results of the *Final Investigation Area H2 Remedial Investigation Report* in a letter dated September 24, 2003 (DTSC 2003d).
- In January 2004, one monitoring well was installed at IR13 to satisfy DTSC's request for additional groundwater monitoring to confirm the conclusions of the *Final Investigation Area H2 Remedial Investigation* which determined that constituents in subsurface soil will not migrate into the groundwater at the site that may discharge to the wetlands to the west (CH2M HILL 2003a). Monitoring well IR13MW0100 was installed along the western boundary of the site, adjacent to the wetlands (Figure 3-1). Results from the January 2004 groundwater monitoring event indicated that no PCBs or PAHs were detected above reporting limits. The second groundwater monitoring event for IR13 was

completed in April 2004. An evaluation of the analytical results from the groundwater monitoring events conducted at IR13 will be presented in a future groundwater monitoring technical memorandum.

**Human Health Risk Assessment for IR13.** The HHRA evaluated the potential cancer risks and the potential for adverse health effects other than cancer from exposures to constituents remaining in soil at IR13 after the soil removal activities. Because the site is intended for the same recreational use as IR10, the future recreational youth receptor was also evaluated in the HHRA for IR13.

The HHRA estimated that future site conditions at IR13 pose potential site and incremental lifetime excess cancer risks of $3 \times 10^{-7}$. The site and incremental hazard indices were 0.003 for the future recreational youth. In addition, the estimated maximum blood-lead concentration for the future recreational youth is lower than the level of concern (10 µg/dL). The exposure point concentration for lead was estimated to be 71 mg/kg, which is well below the residential risk-based levels for Mare Island[6].

Because the cumulative excess carcinogenic risk and the non-carcinogenic hazard indices were within the risk-management range (cumulative excess carcinogenic risk between $1 \times 10^{-4}$ and $1 \times 10^{-6}$ and a hazard index less than 1), and considering reasonable maximum exposure assumptions for the reasonably-anticipated future land use, additional response action at IR13 is not warranted to mitigate risks to human health. The HHRA was accepted by DTSC in letter dated June 23, 2003 (DTSC 2003e). The HHRA was also submitted to USEPA as an application for risk-based closure in compliance with the USEPA CA/FO. USEPA provided comments on this submittal in a letter dated March 9, 2004 (USEPA 2004b). CH2M HILL responded to these comments in April 2004 (CH2M HILL 2004b). USEPA approval of risk-based closure for PCB contamination at IR13 is pending (USEPA pending).

Because PCBs are present in soil above levels consistent with unrestricted use, a land-use covenant is required for IR13. The land-use covenant is pursuant to Section 67391.1 to Title 22, Division 4.5, Chapter 39 of the California Code of Regulations. Following agency review and approval of site closure with a land-use covenant, LMI will record the covenant, as appropriate, and provide a copy of the final recorded land-use covenant along with certification of recordation in Solano County.

**Ecological Risk Assessment for IR13.** As discussed in Section 3.2.1.1, IR10 and IR13 were evaluated together to determine ecological risks from constituents at the sites because the habitat and potential receptors are the same. After quantitative and qualitative evaluation of risks within IR13 and the adjacent wetlands, no further ecological investigation is necessary for the site. The ecological risk assessment was accepted by DTSC in letter dated June 23, 2003 (DTSC 2003e).

### 3.2.1.3 IR14

IR14 is the industrial wastewater treatment plant (IWTP) collection system piping and pump stations, designed to collect, pre-treat, and convey wastewater from various sources

[6] LMI's *Preliminary Land Use Plan* (LMI 2000) indicates that this site is designated for recreational land use. Comparison to the residential risk-based levels was considered as a conservative evaluation assumption.

to the IWTP. The entire Mare Island industrial wastewater collection system comprises 26,000 linear feet of underground pipeline (diameters ranging from 4 to 11 inches), 11 pump stations, and three pre-treatment facilities. The pipeline is constructed of cement mortar-lined, ductile, iron pipe buried at an average depth of 4 to 5 feet bgs in artificial fill consisting commonly of gravel and silt-sand-gravel mix with some debris (PRC 1996). Most of the pipelines (including those within IA H2) are beneath asphalt and were installed in areas of artificial fill soils. Because of Mare Island's generally flat topography, various pump stations were installed to convey wastewater to the IWTP (PRC 1993). Approximately 1,100 feet of this pipeline are within IA H2 and one industrial wastewater pump station (IWPS No. 1) (Building 971) was formerly located within the IA H2 area.

IWPS No. 1 was an open, dry-well, centrifugal-type system and is the final pump station before entering the treatment plant; therefore, all industrial wastewater from buildings across MINS was pumped through this station. The construction of the IWTP, associated piping, and pump stations began in 1972, and the system operated until the base closure in 1996. The Navy performed removal of sludge and residue and flushing of the entire IWTP collection system in 1996.

Before the 1900s, the IWPS No.1 area was submerged off the original western shoreline of Mare Island and was mostly marshland (Navy 1853 and 1911). The area around IWPS No. 1 was originally used for dredge spoils deposition and later used as a parking area. In addition to this information, aerial photographs from 1962 (Navy 1962) show houses situated in the area around IWPS No. 1 currently serving as a parking lot, as shown on Figure 2-1.

The environmental concerns associated with the IWTP collection system include soil and groundwater contamination that may have resulted from piping and pump station leakage, artificial fill contamination, backfill debris disposal, or releases from nearby areas of concern. Portions of the industrial wastewater pipeline have reportedly leaked in the past, and repairs have been made; however, the locations of the leakage and repairs were not documented. The most frequent repairs to the system were apparently performed on the pipeline where it connects to the pump stations (TtEMI 2000a).

**Previous Investigations and Removal Actions at IR14.** The Navy conducted several studies, and CH2M HILL performed a removal action at IR14 to characterize and address environmental contamination at IR14. Provided below is chronology of those studies and removal actions. As the removal actions at IR14 have been conducted based on lead concentrations, the post-removal action lead concentrations are presented on Figure 3-4.

- In 1986, a corrosion investigation concluded that the majority of the soil surrounding the force mains was corrosive and that internal and external corrosion of the force mains had occurred in one of the line sections within IA H2 (Harris and Associates 1986).
- The *Industrial Waste System Pretreatment Study, Baseline Monitoring Report* identified heavy metals, solvents, oil/grease, and high solids as potentially discharging into the industrial wastewater lines within the IA H2 area (Harris and Associates 1987).
- Between 1990 and 1992, Phase I of the remedial investigation was conducted at IR14 systemwide to evaluate whether the IWTP collection system was leaking and if ABM was in the backfill of the IWTP collection system. Ten soil borings were installed along

IR14 across the Mare Island IWTP system, nine samples near the pump stations, and one along the pipeline. One soil boring was installed in IA H2, near IWPS No. 1, during this investigation. The metals constituents detected in the boring near IWPS No. 1 were consistent with the metals concentrations in the wastewater. ABM was not detected at any of the borings in IA H2.

- During 1993 and 1994, the Phase II remedial investigation was conducted to evaluate the extent of soil and groundwater contamination around IWPS No. 1 and the IWTP pipeline segments located within IA H2. Vacuum excavations occurred approximately every 75 feet. Direct-push borings were installed based on locations of the highest contamination detected in the vacuum excavation samples (PRC 1996). All soil samples were submitted to the laboratory for benzene, toluene, ethylene, and xylenes (BTEX); TPH; PCB; and metals analysis. Approximately 15 percent of these samples were submitted for VOC analysis. Where groundwater was encountered in the borings (six locations), a groundwater grab sample was collected. Approximately 35 vacuum excavations and 27 GeoProbe® borings (approximately 110 soil and six groundwater samples) were collected at IR14 within IA H2. The results of these samples are discussed in the *Final Investigation Area H2 Remedial Investigation* (CH2M HILL 2003a) and were included in the human health and ecological risk assessments discussed in the next sections.

- In September 2002, three additional soil samples were collected around IWPS No. 1 to assist in refining the boundaries of the lead contamination in soil and to evaluate the accuracy of the historical X-ray fluorescence (XRF)-analyzed data. Lab analysis was not found to consistently correlate with XRF analysis at the site.

- CH2M HILL, on behalf of LMI, completed a *Final Investigation Area H2 Remedial Investigation Report* that included baseline risk assessments to evaluate risks to human health and the environment at IR14 (CH2M HILL 2003a). Data collected during the previous Navy and CH2M HILL investigations were used in the evaluation of site risks. The HHRA determined that the exposure point concentration for lead was above the risk-based level. The DTSC accepted the results of the *Final Investigation Area H2 Remedial Investigation Report* in a letter dated September 24, 2003 (DTSC 2003d).

- In August 2003, CH2M HILL initiated an interim removal action at the site to remediate subsurface soil contaminated with lead. IWPS No. 1 was removed during the removal action, and soil around the pump station was excavated. Based on the observation of a slight hydrocarbon sheen on the groundwater in the excavation, confirmation soil samples were also analyzed for PAHs. Excavation was continued at the site until the confirmation samples indicated that lead concentrations were below residential risk-based levels and PAH concentrations were below residential PRGs. Once the removal action objectives had been met, the site was backfilled with clean soil in December 2003. Approximately 490 cubic yards of soil was disposed of off site and approximately 155 tons of concrete and debris were crushed and recycled. Details of the removal action and risk assessment based on post-removal action site conditions are included in the *Draft Interim Removal Action Summary and Closure Report for IR14 and IWPS No. 1 in Investigation Area H2* (CH2M HILL 2004a). Post-removal action lead concentrations are shown in Figure 3-4.

- In January 2004, one monitoring well was installed at IR14 to satisfy DTSC's request for additional groundwater monitoring to confirm the conclusions of the *Final Investigation Area H2 Remedial Investigation* which determined that constituents in subsurface soil will not migrate into the groundwater at the site that may discharge to the wetlands to the west (CH2M HILL 2003a). Monitoring well IR14MW0100 was installed along the western boundary of the site, adjacent to IR10 (Figure 3-1). Results from the January 2004 groundwater monitoring event indicated that no lead, TPH-diesel, or TPH-motor-oil were detected above reporting limits. The second groundwater monitoring event for IR14 was completed in April 2004. An evaluation of the analytical results from the groundwater monitoring events conducted at IR14 will be presented in a future groundwater monitoring technical memorandum.
- In April 2004, in accordance with RCRA, the IR14 pipeline was inspected to assess if any waste remains in place (DTSC 2004a). Inspection of the pipeline by video survey revealed that the pipeline was intact and in good condition. No breaks were observed; however, solids were found intermittently in the pipeline. Therefore, the solids will be sampled and additional flushing of the line will be performed, if necessary, to remove the solids from the pipeline to comply with the requirements of RCRA, as described in Section 5.2.

**Human Health Risk Assessment for IR14.** The HHRA evaluated the potential cancer risks and the potential for adverse health effects other than cancer from exposures to constituents remaining in soil at IR14 after the soil removal activities. The HHRA presented risk estimates based on reasonable maximum exposure assumptions. The site was evaluated according to its planned residential land use. Despite the fact that the most plausible potential exposure for residential receptors would be to surface soil, the risk assessment assumed that construction activities associated with the building of future residential housing would result in excavation of subsurface soils where potential mixing with surface soil could occur. Therefore, the soil data from the mixed-zone depth interval (0- to 10-foot bgs) were used to calculate potential human health risks from constituents at IR14.

The HHRA estimated risk from future site conditions at IR14 for the adult resident and a child who grows into an adult resident. The potential site lifetime excess cancer risks were determined to be $5 \times 10^{-6}$, and the site hazard index was 0.4 for the future residential receptor. In addition, the estimated maximum blood-lead concentration for the future residential receptor is lower than the level of concern (10 μg/dL). The exposure point concentration for lead was estimated to be 182 mg/kg, which is below the residential risk-based levels for Mare Island. Details of the post-removal action HHRA calculations are presented in the *Draft Interim Removal Action Summary and Closure Report for IR14 and IWPS No. 1 in Investigation Area H2* (CH2M HILL 2004a). DTSC is reviewing this report for consistency with the final remedy identified in this RAP.

Because the cumulative excess carcinogenic risk and the non-carcinogenic hazard indices were within or below the risk-management range (cumulative excess carcinogenic risk between $1 \times 10^{-4}$ and $1 \times 10^{-6}$ and a hazard index less than 1), and considering reasonable maximum exposure assumptions for the reasonably anticipated future land use, additional response action at IR14 is not warranted to mitigate risks to human health.

**Ecological Risk Assessment for IR14.** The ecological risk assessment determined that no ecological receptors occur and no complete exposure pathway exists within IR14; therefore, no ecological risk is posed directly by the site (i.e., the IR14 pump station and buried pipeline). In addition, based on the relatively low hazard quotients and the conservative assumptions on which they are based, the risks to ecological receptors from groundwater constituents at IR14 that may arrive at the wetlands through the potential groundwater migration pathway are considered low to negligible, and no further ecological investigation is necessary. The ecological risk assessment was accepted by DTSC in letter dated June 23, 2003 (DTSC 2003e).

## 3.2.2 Underground Storage Tank Program Sites

Four USTs (USTs 243-1, 243-2, 231-1, and 231-2) within IA H2 were identified and investigated as part of the Navy UST program, as summarized in Table 3-1. These USTs are documented in various reports including the Supplemental EBS (SSPORTS 1996, 1999a), the *Underground Storage Tank Summary Data Report, Revision I* (SSPORTS 1999b), and the *Site Characterization Report for Underground Storage Tank Sites In Investigation Area H2* (CH2M HILL 2003d). The former locations of the four UST sites are shown on Figure 3-1.

**TABLE 3-1**
Summary of UST Sites in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Tank Number | Tank Status | Capacity (gallons) | Contents | Closure Status |
|---|---|---|---|---|
| 243-1 | Removed | 6,300 | Gasoline, possibly diesel fuel | A request for closure will be submitted to RWQCB following completion of the removal action, as proposed in the *Site Characterization Report Addendum: Interim Remedial Action Work Plan IA H2 UST Sites* (CH2M HILL pending(b)),and will be summarized in the *Implementation Report and Request for Closure for IA H2 UST Sites* (CH2M HILL pending(c)). |
| 243-2 | Removed | 6,300 | Gasoline, possibly diesel fuel | |
| 231-1 | Removed | 8,000 | Gasoline, possibly diesel fuel | |
| 231-2 | Removed | 8,000 | Gasoline, possibly diesel fuel | |

Source: *Underground Storage Tank Summary Data Report, Revision I* (SSPORTS 1999b).

All four USTs in IA H2 were associated with a former gasoline station at Mare Island. USTs 243-1 and 243-2 were located immediately north of Building 243 and were installed in the 1930s. USTs 231-1 and 231-2 were installed in 1942 just west of Building 231 to increase the storage capacity of the gasoline station and were attached by pipeline to USTs 243-(1)(2). The USTs could have been filled from either USTs 243-1 and 243-2, a railcar, or a tank truck.

USTs 243-1 and 243-2 each had a capacity of 6,300 gallons and were constructed of riveted steel. Both USTs and the associated pipeline were removed on December 15, 1992, when USTs 231-1 and 231-2 became the sole source for the gas station. Both USTs 231-1 and 231-2 were single-walled steel cylinders with a capacity of 7,500 gallons. Removal of USTs 231-1 and 231-2 and the fuel dispensing system was completed on October 26, 1995.

The Navy performed several investigations of the UST 243/231 area. In 1993 and 1997, the Navy performed investigations to horizontally delineate the extent of contamination at the sites. Soil samples contained elevated concentrations of TPH-diesel, TPH-gasoline, benzene, and low levels of SVOCs, TPH-motor-oil, toluene, ethylbenzene, and xylene. Three monitoring wells were installed and groundwater samples were found to contain elevated levels of TPH-gasoline, TPH-diesel, benzene, and methyl tert-butyl ether (MTBE).

A removal action was conducted by the Navy in 1999. Only half of the proposed excavation area around UST 243/231 was completed. The removal action did not address the contamination near the former UST sites or directly along the piping trench.

In August and September 2002, CH2M HILL conducted additional soil and groundwater sampling to characterize the extent of contamination around the USTs and associated pipeline. Ten soil borings and four groundwater monitoring wells were installed during the investigation. Soil samples contained elevated levels of TPH-gasoline, benzene, and ethylbenzene. Groundwater samples contained elevated levels of TPH-gasoline, TPH-diesel, and xylene. A groundwater plume was defined extending from the former location of USTs 231-1 and 231-2 approximately 220 feet to the northwest. However, the concentrations of TPH-gasoline in the plume were found to have decreased significantly since 1997 (from a maximum concentration of 47 milligrams per liter [mg/L] to 3.4 mg/L). In addition, the investigation determined that a pipeline running west from former UST 231-1 to the tank car filling stem had not been removed.

Additional soil removal activities are proposed at the UST sites, as described in the *Site Characterization Report Addendum: Interim Remedial Action Work Plan Investigation Area H2 UST Sites* (CH2M HILL pending(b)). The results of these soil removal activities will be summarized in the *Implementation Report and Request for Closure for IA H2 UST Sites* (CH2M HILL pending(c)).

## 3.2.3 Polychlorinated Biphenyls Program Sites

Through reviews of historical documents and visual site surveys, three PCB sites were identified by the Navy, and one additional PCB site was identified by CH2M HILL in IA H2. These four locations are the central bay floor inside Building 529, an asphalt area outside of Building 529, a machine shop in the western end of Building 529, and the transformer pad west of Building Q29. The PCB sites (assessment locations and unknown location) are listed in Table 3-2. The locations of the IA H2 PCB sites are shown on Figure 3-1.

Navy personnel from SSPORTS conducted a PCB interim assessment in 1996 in IA H2. During the interim assessment, 30 samples were collected in IA H2 for PCB analysis.

### 3.2.3.1 PCB Sites at Building 529

Abatement was determined to be necessary at all three of the PCB sites in Building 529 based on the interim assessment data. In 1997, SSPORTS scabbled areas inside the building in the central bay area and outside the building. SSPORTS performed three subsequent rounds of scabbling inside the building in the central bay area during 1997 and 1998. During this time, SSPORTS also washed a portion of the machine shop floor in the western end of the building. SSPORTS collected an additional 85 verification samples for PCB analysis following abatement at the site associated with Building 529.

In 1998, TtEMI performed confirmation sampling in Building 529. The objective of the confirmation sampling was to collect a sufficient number of samples from each PCB assessment location to either confirm SSPORTS findings or define areas for further abatement and re-sampling, if warranted. Typically, confirmation samples were collected from areas that appeared to have undergone the greatest PCB exposure or were closest to the PCB source or former source area. Six confirmation samples were collected in the central bay area and outside Building 529 (TtEMI 1998). Confirmation samples were not collected in the machine shop floor area inside Building 529.

Because some of the Navy documentation of the sample locations was incomplete and several of the laboratory reports were unavailable, CH2M HILL collected replacement samples at 28 of the sample locations and collected 31 additional concrete samples during June and September 2002. Based on these results, CH2M HILL scabbled areas of the concrete outside the building and collected 15 verification samples. The maximum PCB concentration remaining at Building 529 after this cleanup action was 7.55 mg/kg in concrete.

In addition to the scabbling outside the building, CH2M HILL collected wipe samples of the machine shop floor inside the western end of the building. The maximum PCB concentration detected was 0.95 micrograms per one hundred square centimeters ($\mu g/100\ cm^2$). DTSC and USEPA concurred that no further action was required for the machine shop floor inside the west end of the building (DTSC 2003a; USEPA 2004a).

To address the concern of whether there has been a release of PCBs to the environment, CH2M HILL personnel collected three soil samples from under the concrete pavement outside of the building and seven soil samples under the concrete floor inside the central bay area. These samples were collected from biased locations based on initially high PCB concentrations in the concrete (prior to scabbling) and in proximity to expansion joints and/or cracks in the concrete. PCBs were not detected above the laboratory reporting limit in three of the 10 soil samples. The detected PCB concentrations in soil ranged from 0.05 mg/kg to 4.87 mg/kg.

The *Final Polychlorinated Biphenyl Work Plan* (CH2M HILL 2003h) illustrates the process for PCB site closure under both CERCLA and the Toxic Substances Control Act (TSCA). PCB sites in the EETP are subject to closure under both TSCA and CERCLA, under the USEPA CA/FO (USEPA et al. 2001), and the Consent Agreement (LMI et al. 2001), respectively. Closure requirements for PCB-contaminated material pursuant to the TSCA regulations at 40 CFR 761 are regulated by the USEPA. Closure requirements for PCB-contaminated material pursuant to the CERCLA regulations are regulated by DTSC.

PCB sites can be subject to CERCLA if there is a known release to soil or groundwater or there is a potential threat for a release of PCBs to the environment. A potential threat is determined by the following three criteria: (1) there is a potential PCB source present; (2) there is PCB contamination present; and (3) there is a visible pathway for migration (e.g., a crack in a concrete pad).

For PCB sites where there has been a release to soil, the USEPA Region 9 PRGs are used as the soil screening criteria, which are 0.74 mg/kg for industrial use and 0.22 mg/kg for residential use. PCB sites that are either remediated to Region 9 PRGs or subject to site-specific, risk-based closure under CERCLA by default will satisfy any TSCA

requirements for site closure. This is because the CERCLA PRGs are more restrictive than TSCA cleanup standards, and a site-specific, risk-based closure process satisfies both USEPA and DTSC.

CH2M HILL submitted a site-specific Cleanup Plan/Notification letter for the two PCB sites at Building 529 that require additional cleanup actions, in accordance with the Consent Agreement and the USEPA CA/FO (CH2M HILL 2003b). The Cleanup Plan proposed concrete and soil excavation, which is a common and well-proven method of removing contaminated surface and subsurface materials from a site. DTSC concurred that the planned removal action for the concrete and soil beneath the concrete to be remediated to levels consistent with unrestricted use was acceptable in a letter dated February 27, 2004 (DTSC 2004b). USEPA concurred that soils under the expansion joints and cracked areas in the concrete floor would be removed to a depth of 1 foot, and 50 verification samples would be collected in a letter dated December 18, 2003 (USEPA 2003b). The removal action was initiated in May 2004. The results of the removal action, including the post-removal action risk assessment, will be presented in the *Implementation Report for Building 529 PCB Sites* (CH2M HILL pending(a)).

**TABLE 3-2**
Summary of PCB Assessment Locations in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| PCB Site Name | Site Description | Site Location (Inside/ Outside) | Cleanup Activities Performed | Remaining Maximum PCB Concentration (concrete) | Remaining Maximum PCB Concentration (soil) |
|---|---|---|---|---|---|
| Building 529 AL#01 | Central bay floor | Inside/Outside | Scabbled concrete three times | 7.55 mg/kg | 4.87 J mg/kg |
| Building 529 AL#02 | Asphalt abatement area | Outside | Scabbled concrete | 1.1 mg/kg | NA |
| Building 529 UL#01 | Machine shop Floor | Inside | Washed floor | 0.95 $\mu g/100\ cm^2$ | NA |
| Building Q29 | Transformer pad | Outside | None | ND | NA |

Notes:
NA = not applicable.
ND = not detected.

### 3.2.3.2 PCB Site at Building Q29

An additional PCB site was identified during the interim PCB assessment at the transformer pad west of Building Q29. PCBs were not detected at this site at concentrations exceeding the laboratory reporting limit. The USEPA documented their determination that NFA is required at Building Q29 in a letter dated May 28, 2003 (USEPA 2003a). DTSC concurred that no further action is required at Building Q29 in a letter dated August 6, 2003 (DTSC 2003b).

### 3.2.4 Unexploded Ordnance Program

The Navy's program to address the nature and extent of potential UXO contamination at the former MINS focused on active and historic dredge ponds and ordnance reservoirs, landfilled areas, small-arms ranges, ammunition production areas, buried magazine areas, and other ordnance processing and storage areas. A PA/SI study was performed to identify sites that may contain UXO and related contamination. In addition, ordnance surveys were performed as part of the base closure process.

Neither live explosive ordnance nor ordnance ingredients were manufactured or stored in any of the buildings and surrounding area within IA H2. No record of ordnance-related operations exist for IA H2 (SSPORTS 1996, 1997a, 1999a). Additionally, none of the old rifle or firing ranges are located within IA H2 (PRC 1995b). Therefore, no further investigation or response action is necessary within IA H2 to address environmental concerns related to unexploded ordnance.

### 3.2.5 Radiological Decommissioning Program

Throughout its history, MINS was engaged in the construction and overhaul of naval ships and, beginning in 1956, operations included the overhaul and refueling of nuclear-powered submarines. Radiological facilities at the former MINS were deactivated between 1994 and 1996 in accordance with basewide decommissioning plans.

Decommission activities were conducted under two separate programs, the Naval Nuclear Propulsion Program (NNPP) and the Radiological Affairs Support Program (RASP). The NNPP covered facilities used in the construction overhaul and refueling of naval nuclear-powered submarines and surface ships. Radioactivity associated with the RASP, designated as general radioactive material or G-RAM, included radiographic and instrument calibration sources, various instrumentation, and radioluminescent products. Results of the decommissioning activities are documented in the *Naval Nuclear Propulsion Program Radiological Final Report for the Decommissioning of Mare Island Naval Shipyard* (MINS 1996b) and the *General Radioactive Material Program (G-RAM) Radiological Site Inspection Report for the Decommissioning of Mare Island Naval Shipyard* (MINS 1996c).

Under both the NNPP and G-RAM decommissioning programs, extensive surveys were performed with sensitive instruments in areas where radioactive material was used, handled, stored, or transported. A rigorous quality assurance program was implemented to ensure the validity of the survey data obtained. The areas where low-level radioactivity was detected in excess of permissible limits were remediated and re-surveyed for unrestricted use.

Areas of potential radiological concern within IA H2 are listed in Table 3-3.

**TABLE 3-3**
Radiological Decommissioning Program in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| IA H2 Facility | Radiological Survey Classification | Radiological Concern |
|---|---|---|
| 529 | (G) | Public Work Fabrication and Nuclear Training. Previously used for radium and G-RAM storage and as a radiological mock-up training facility. |
| 531 | (G) | General Warehouse and Naval Electronics Office. Previously used as a radioactive liquid solidification facility. |
| Groundwater | N, G | Groundwater. |

Notes:
N = Radiological survey performed under the NNPP based on past history of use.
G = Radiological survey performed under the G-RAM Program based on past history of use.
(G) = Radiological survey performed under G-RAM Program as added measure of precaution, but no history of radiological use.

Building 529 and Building 531 were surveyed under the G-RAM program. G-RAM radiological decommissioning surveys performed in Buildings 529 and 531 showed no Cobalt-60 or Radium-226 radioactivity, respectively, above the activity limit for solid material samples. Gamma scintillation surveys did not detect areas with radiation levels greater than or equal to twice the naturally-occurring background radiation levels. Radioanalysis of a single solid material (concrete) sample obtained from the area in each building with the highest gamma scintillation survey reading showed radionuclide levels below the activity limits. Additionally, when analyzed for specific Cobalt-60, the samples were less than the minimum detectable activity.

The radiological decommissioning included the collection of groundwater samples from existing monitoring wells on Mare Island. Groundwater analysis included both G-RAM and NNPP nuclides of concern. In IA H2, groundwater well BGW05 (see Section 3.2.6) was included in the groundwater sampling. The results of the groundwater sampling showed that groundwater had not been adversely affected by the radiological industrial activity on Mare Island (MINS 1996c).

The DTSC and USEPA provided ongoing review and quality assurance oversight throughout the radiological decommissioning program. Both the NNPP and G-RAM radiological decommissioning final reports were reviewed by these agencies after remediation activities were completed (as necessary), and final documentation indicated that all final confirmation surveys and sampling results were below the identified action limits. As documented in letters to the Navy, the agencies have approved the reports and have agreed that the facilities in IA H2 are acceptable to release to the community for unrestricted use with respect to the NNPP and G-RAM programs (DTSC 1996, 1997; USEPA 1996; MINS 1996a, 1997a).

No additional investigation or response action is necessary to address the areas of past radiological material use and storage in IA H2.

### 3.2.6 Basewide Groundwater Monitoring Program

In 1992, the Navy initiated a basewide quarterly groundwater monitoring program at Mare Island. Before 1992, the Navy had regularly monitored groundwater at selected locations on Mare Island including the facility landfill, Dry Dock No. 3, and the IWTP surface ponds. During the initial basewide groundwater monitoring program, six sampling events were conducted between November 1992 and May 1994, during which at least four complete rounds of groundwater samples were collected from each well. The analytical data from the sampling events conducted between November 1992 and May 1994 were compiled and evaluated in the groundwater status report (PRC 1995c).

In 1995, as part of the remedial investigation of Group I IRP sites, 57 additional wells were installed at various IRP sites. The wells were sampled once in 1995 and then for four consecutive quarters (between November 1997 and August 1998) as part of the Phase II Quarterly Monitoring Program (TtEMI 1999a). In 1999, 48 more wells were installed at various sites as part of the Group II and III investigation; these wells were sampled just after being installed and again for three consecutive quarters (between June 1999 and January 2000) (TtEMI 2000b).

The monitoring wells in IA H2 are shown in Figure 3-1. One background monitoring well was installed in IA H2 (BGW05) in 1993 and was included in the basewide groundwater monitoring program. This well was sampled quarterly between 1993 and 1994 and again in 1999. Constituents detected include aluminum, arsenic, barium, beryllium, chromium, cobalt, lead, manganese, vanadium, and zinc. VOCs were not detected at BGW05. Many of the remaining wells in IA H2 (UST243M19, UST243M21, and UST243M22, installed by the Navy and UST243/231MW0100 through UST243/231MW0103, installed by CH2M HILL) are associated with USTs 243-1, 243-2, 231-1, and 231-2, as discussed in Section 3.2.2. The four wells associated with the IR sites in IA H2 (IR10MW0100, IR10MW0101, IR13MW0100, and IR14MW0100) are discussed in Section 3.2.1.

The results of the basewide groundwater monitoring program indicate no additional sites of environmental concern (CH2M HILL 2002a).

### 3.2.7 Abrasive Blast Material

Historically, extensive abrasive blasting was performed at the MINS to prepare ship hulls for repainting. Because of the use of LBP on ships, elevated levels of lead occasionally are found in the spent ABM. Other constituents found in spent ABM include chromium, copper, nickel, zinc, and tributyltin. Spent ABM was used periodically for pipeline bedding material and as backfill following excavations. This material may exist in any backfill areas or below asphalt-coated surfaces (SSPORTS 1996; 1999a). Past UST and utility repair and closure work at Mare Island indicates that spent ABM has typically been encountered in 5 to 10 percent of the excavations (TtEMI 1999b). ABM may exist in other areas of IA H2, and if, during future development activities, ABM is encountered, it will continue to be handled under DTSC oversight. A procedure for managing ABM will be developed as part of the RAP implementation.

There are no comprehensive records documenting locations of spent ABM disposal within IA H2. In the building closure file for Building 433 (MINS 1997c), the MINS noted "Beyond this building's 5 foot boundary to the south, are large amounts of ABM on the ground."

Based on inspections of the building performed by CH2M HILL, evidence of an underground utility removal was apparent throughout the building, and ABM was present outside the southeast corner of the building in a 20-foot by 20-foot area approximately 1 foot deep. ABM removal and sampling activities were performed in accordance with the methods and procedures documented in the *Sampling and Analysis Plan for Abrasive Blast Material* (CH2M HILL 2003). Approximately 20 cubic yards of ABM were removed and properly disposed of off site at a Class II Landfill in February 2004, as documented in the *Technical Memorandum for ABM Removal at Building 433, Investigation Area H2* (CH2M HILL pending(d)).

### 3.2.8 Lead in Soil from Lead-based Paint

LBP was commonly used at MINS prior to 1978, when the use of LBP was discontinued. Navy surveys have verified the presence of LBP on many building surfaces and the presence of lead in soil adjacent to structures painted with LBP. Lead found in soil adjacent to structures painted with LBP is considered a hazardous substance that should be investigated and remediated. DTSC has determined that all structures older than 1978 with painted surfaces and unpaved surrounding areas should be characterized and remediated for lead in soil from LBP, as necessary (DTSC 2004a).

The age of the buildings constructed in IA H2 allows the presumption that LBP may be present on all facilities except Buildings 1327 and 1331, which were built in 1987 (SSPORTS 1999a). Asphalt or concrete surrounds most structures in IA H2; however, landscaping surrounds many of the buildings, which are all located in areas planned for residential use.

The presence of LBP on structures in Parcel 04-A, including Buildings 19, 21, 29, 29A, and 29G, as well as Building 131 in Parcel 06-B4, was confirmed by the Navy during LBP surveys. According to the Navy Lease Restriction Revision Form (Navy 1998) for the Navy Reuse Parcel 04-A, buildings with confirmed LBP that have not performed lead abatement actions currently have restrictions forbidding the structure to be used as a residence.

The presence of lead in soil adjacent to structures painted with LBP was also investigated by the USEPA and the Navy. The Navy performed LBP-in-soil inspections in the mid-1990s, mostly around buildings that were used as military housing and were planned for residential reuse. These inspections included limited soil sampling to determine potential human health hazards associated with LBP in soil. Although records do not indicate sampling adjacent to buildings within IA H2, soil samples were collected outside of former housing just south of IA H2 (in IA D1) and in other former residential areas within the MINS. Elevated concentrations of lead above the residential risk-based levels were detected in soil samples collected at residential structures located just south of IA H2 (Navy 1996).

Because it is possible that degraded paint chips were released to the soil adjacent to buildings in unpaved areas, additional characterization was performed for structures built before 1978 with painted surfaces and unpaved surrounding areas in IA H2. Specifically, Buildings 19, 21, 29, 29A, 29G, 131, 131A, and 913 were characterized in April 2004.

Lead in soil from LBP was addressed according to procedures presented in the *Final Generic Sampling and Analysis Plan for the Evaluation of Lead-based Paint and Pesticides in Soil* and the *Sampling and Analysis Plan for Evaluation of Lead-based Paint in Soil in IA H2*

(CH2M HILL 2003i, 2004c). The sampling methodology for evaluation of LBP in soil involved the collection of composite soil samples along each of the four drip lines around existing buildings (approximately 10 to 12 inches away from the edge of the building) and the collection of a discrete soil sample from the four mid-yard areas of the existing buildings. The drip-line samples were composite soil samples collected from each side of the building or structure, using up to 10 soil samples collected on approximate 6-foot centers. The mid-yard samples were discrete soil samples collected from the approximate geographic center of the front, rear, and side yard areas of each building. The soil samples were collected from 0 to 3 inches bgs and exclude any landscaping materials including (but not limited to) bark chips, rocks, concrete, wood, and/or vegetation. Soil samples were only collected on the sides of the structures with unpaved areas. Several structures are surrounded by pavement on one of more sides of the structure.

Following this sampling methodology, soil samples were analyzed for lead to characterize each building. As directed by DTSC, remediation for LBP in soil on any of the four sides of a building is required in areas planned for residential use when one of the following conditions is met:

- The average lead concentration of the composite drip-line soil sample and the mid-yard sample for a particular side of the building exceeds the residential risk-based level (210 mg/kg).
- The maximum lead concentration in a single soil sample (composite or mid-yard) significantly exceeds the residential risk-based level (above 400 mg/kg), even if the average of samples does not exceed the residential risk-based level.

The analytical results of the characterization samples were compared to the conditions above to determine sites which required remediation for LBP in soil. Based on this comparison, a remedy is required for lead in soil surrounding all of the buildings listed above. Table 3-4 presents a summary of the buildings which require remediation for LBP in soil in IA H2.

**TABLE 3-4**
Summary of Buildings Requiring Remediation for LBP in Soil in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Building | Building Description | Current Status | Future Land Use | Maximum and Average Concentration (mg/kg)[b] | Remediation Required? |
|---|---|---|---|---|---|
| 19[a] | Officers' Quarters | Occupied – Administrative | Residential | 1,100<br>755 | Yes |
| 21 | Officers' Quarters | Vacant | Residential | 1,300<br>895 | Yes |
| 29[a] | Officers' Quarters | Occupied – Administrative | Residential | 1,300<br>905 | Yes |

**TABLE 3-4**
Summary of Buildings Requiring Remediation for LBP in Soil in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Building | Building Description | Current Status | Future Land Use | Maximum and Average Concentration (mg/kg)[b] | Remediation Required? |
|---|---|---|---|---|---|
| 29A | Garage | Vacant | Residential | 430 | Yes |
| | | | | 355 | |
| 29G | Garage | Vacant | Residential | 450 | Yes |
| | | | | 295 | |
| 131 | Officers' Quarters | Vacant | Residential/ Recreational | 2,700 | Yes |
| | | | | 1,590 | |
| 131A/913 | Garage / Chaplin Study Quarters | Vacant | Residential | 1,900 | Yes |
| | | | | 1,450 | |

[a] Buildings that are currently occupied.

[b] The highest average concentration (i.e., of the drip-line samples or the mid-yard samples on each of the sides of the structure which was sampled) is given.

## 3.3 Summary of Sites

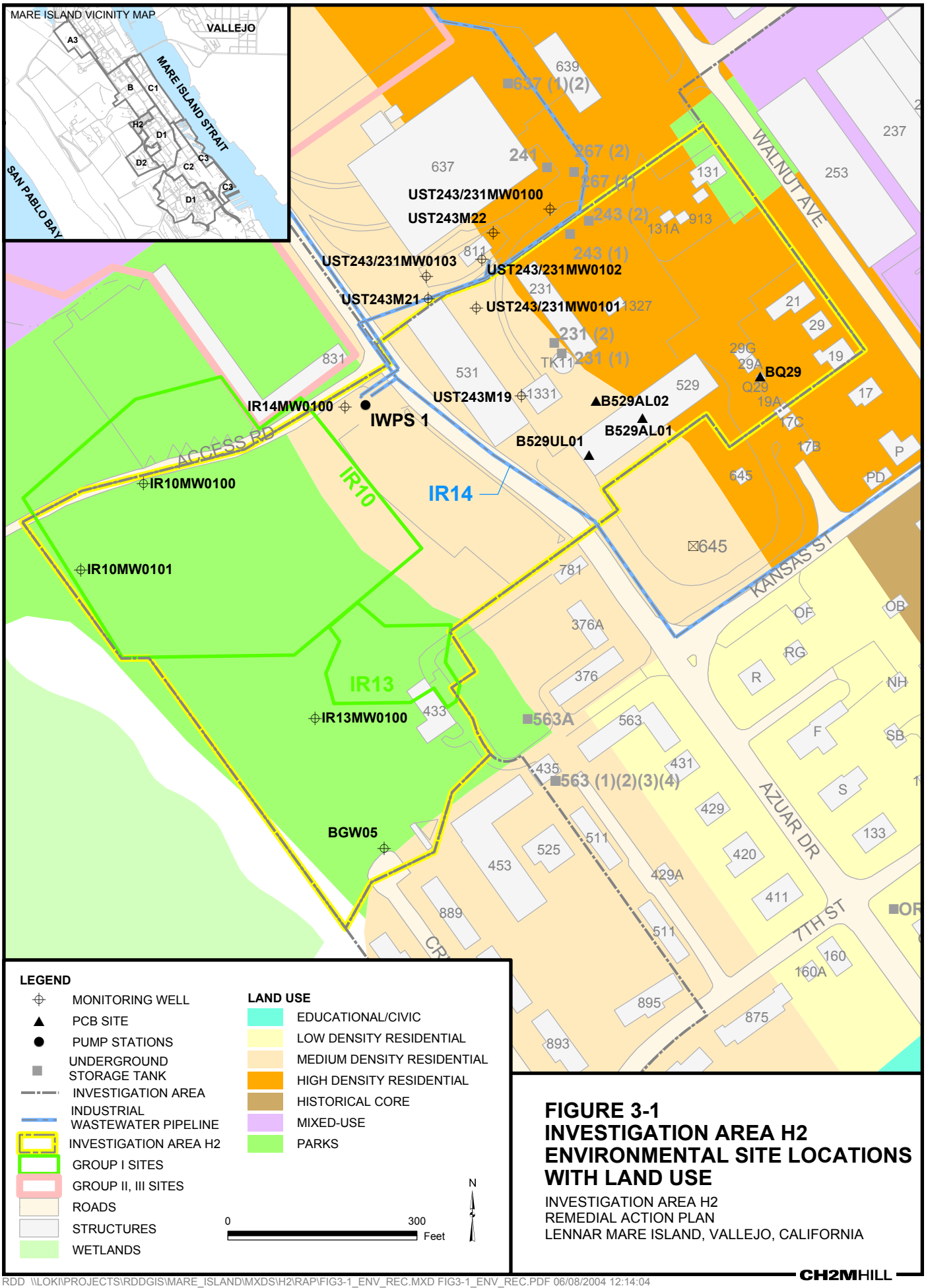
The sections above present site descriptions and evaluation of the previous investigations that have occurred at all the environmental sites in IA H2. This section summarizes all the sites in IA H2 and identifies whether further action is required. The UST sites are not included in this summary section. Remedial decisions about the UST sites are being made in accordance with the RWQCB Order.

As presented in the sections above, an NFA determination for unrestricted use is appropriate at two PCB sites: Building 529 UL#01 and Building Q29 AL#01.

A remedy is proposed at the remaining environmental sites in IA H2, as presented in Table 3-5. The locations of the sites where removal actions will be performed are shown on Figure 3-5. The descriptions of the proposed remedies are presented in Section 5.0.

**TABLE 3-5**
Summary of CERCLA Sites that Require Further Action in IA H2
*Investigation Area H2 Remedial Action Plan, Lennar Mare Island, Vallejo, California*

| Environmental Site | Constituents of Concern | Future Land Use | Cleanup Goal |
|---|---|---|---|
| Lead in soil from LBP within IA H2 (Buildings 19, 21, 29, 29A, 29G, 131, 131A, and 913) | Lead above levels consistent with unrestricted use | Residential | Average concentration: 210 mg/kg<br>Maximum concentration: 400 mg/kg |
| IR10 | PCBs, PAHs, and Lead above levels consistent with unrestricted use | Recreational | Land-use covenant restricting use to recreational by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers |
| IR13 | PCBs above levels consistent with unrestricted use | Recreational | Land-use covenant restricting use to recreational by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers |
| IR14 (IWPS No.1) in IA H2 | Residual solids remaining inside the pipeline | Residential | Sample and remove solids remaining in place, if necessary |
| Building 529 AL#01 and AL#02 | PCBs: 7.55 mg/kg (concrete); 4.87 mg/kg (soil) | Residential | 1 mg/kg in concrete<br>0.22 mg/kg in soil |




# FIGURE 3-1
# INVESTIGATION AREA H2 ENVIRONMENTAL SITE LOCATIONS WITH LAND USE

INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\MARE_ISLAND\MXDS\H2\RAP\FIG3-1_ENV_REC.MXD FIG3-1_ENV_REC.PDF 06/08/2004 12:14:04

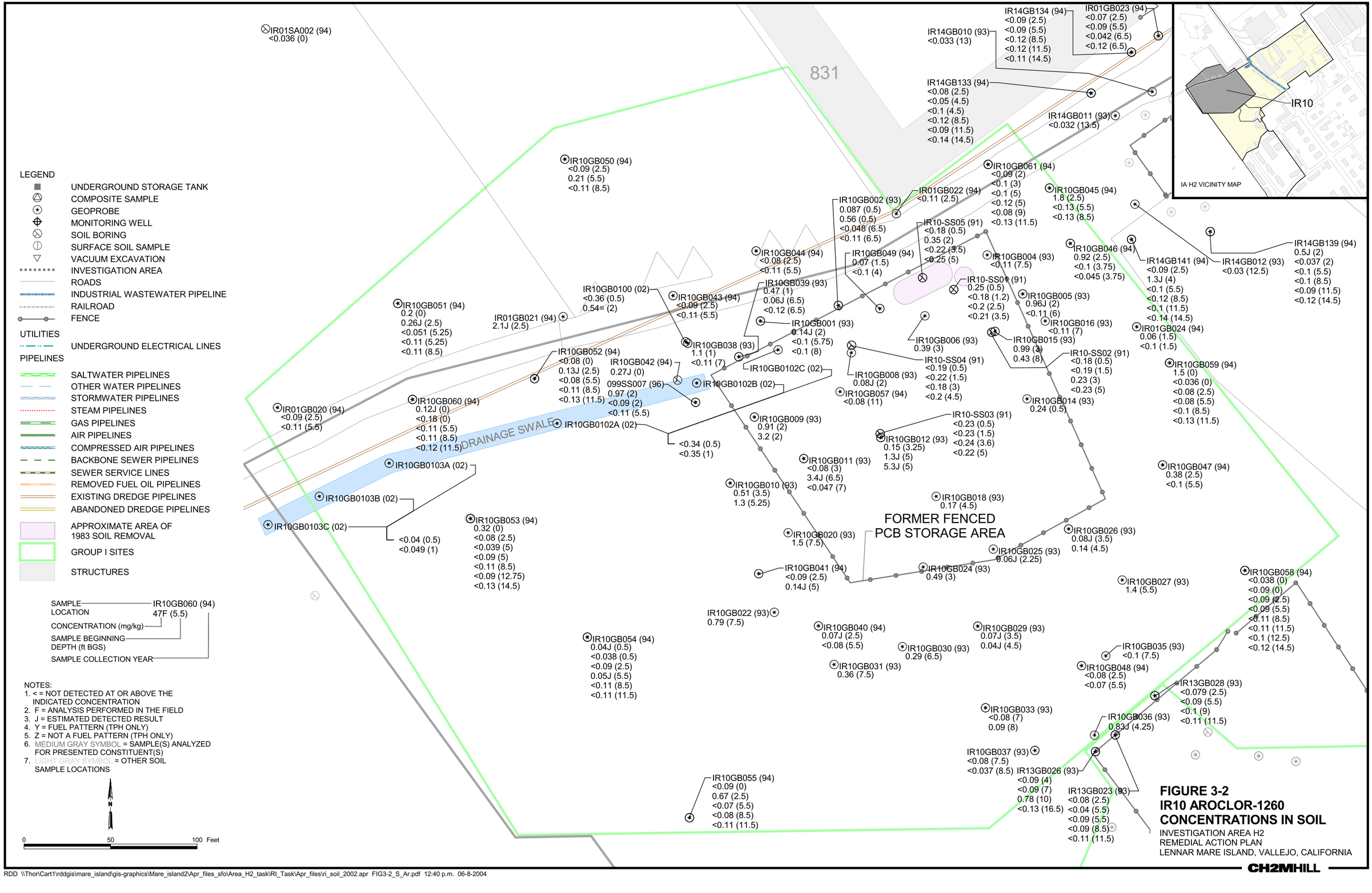
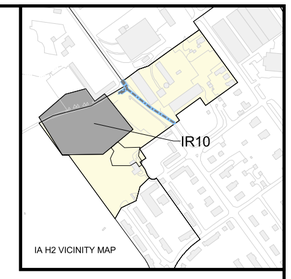



**FIGURE 3-2**
**IR10 AROCLOR-1260 CONCENTRATIONS IN SOIL**
INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

RDD \\Thor\Cart1\rddgis\mare_island\gis-graphics\Mare_island2\Apr_files_sfo\Area_H2_task\RI_Task\Apr_files\ri_soil_2002.apr FIG3-2_S_Ar.pdf 12:40 p.m. 06-8-2004




IR10GB035 (93)
<0.1 (7.5)

IR10GB048 (94)
<0.08 (2.5)
<0.07 (5.5)

IR13GB028 (93)
<0.079 (2.5)
<0.09 (5.5)
<0.1 (9)
<0.11 (11.5)

IR10GB036 (93)
0.83J (4.25)

IR13GB023 (93)
<0.08 (2.5)
<0.04 (5.5)
<0.09 (5.5)
<0.09 (8.5)
<0.11 (11.5)

IR13-SB01 (91)
<1.5 (9.5)
<0.22 (11)

IR10GB037 (93)
<0.08 (7.5)
<0.037 (8.5)

IR13GB026 (93)
<0.09 (4)
<0.09 (7)
0.78 (10)
<0.13 (16.5)

FORMER LOW-LYING AREA

IR13GB010 (93)
<0.09 (2.5)
<0.09 (5.5)
<0.09 (8.5)
<0.11 (12)
<0.11 (14.5)

IR13GB002 (93)
<0.09 (2.5)
<0.09 (5.5)
<0.09 (8.5)
<0.12 (11.5)
<0.12 (18)

IR13GB001 (93)
<0.12 (11.5)
<0.15 (18.5)

IR13GB050 (94)
<0.09 (2.5)
<0.09 (5.5)

IR13GB042 (94)
0.06J (2.5)
<0.09 (5.5)
<0.11 (8.5)
<0.12 (11.5)
<0.055 (14.25)
<0.13 (14.25)
<0.1 (17.5)

IR13GB018 (93)
0.05J (2.5)
<0.09 (5.5)
<0.09 (11.5)
<0.1 (14)
<0.11 (14)
<0.13 (16.5)
<0.13 (18.5)

IR13GB102 (02)
0.17= (17.5)
<0.056 (19.5)

IR13GB011 (93)
<0.09 (2.5)
<0.09 (5.5)
<0.1 (8.5)
<0.09 (11.5)
<0.1 (12.5)
<0.11 (15.5)
8.8 (17.5)
<0.13 (17.5)

IR13-SB03 (91)
0.25 (9.5)
<0.24 (11)

IR13GB025 (93)
<0.08 (2.5)
<0.09 (8.5)
<0.1 (11.5)
<0.12 (14.5)

IR13CS224 (99)
<0.02 (9)
0.11 (12)
0.049 (15)

IR13CS222 (99)
<0.019 (9)
0.68 (12)
0.32 (15)

IR13CS226 (99)
0.076 (9)
0.015J (12)
0.052 (15)

IR13CS0108
<0.046 (24)
IR13CS0107
0.079= (24)

IR13GB008 (93)
<0.08 (17.5)
0.25J (19.5)

APPROXIMATE 2002
LIMITS OF EXCAVATION

FORMER DRAIN LINE
(ESTIMATED LOCATION)

IR13GB029 (93)
<0.09 (3)
<0.09 (5.5)
<0.02 (8.5)
<0.051 (11.25)
<0.1 (11.25)
<0.11 (15)

IR13CS220 (99)
0.029 (9)
0.36 (12)
0.2 (15)

FORMER
OUTFALL
AREA

IR13CS228 (99)
<0.018 (9)
<0.019 (12)
0.099 (15)

IR13GB047 (94)
0.12J (2.5)
<0.09 (5.5)
<0.08 (8.5)
<0.14 (12)
<0.11 (14.5)

IR13GB031 (93)
<0.09 (2.5)
<0.09 (5.5)
<0.09 (8.5)
0.16J (11.5)
<0.11 (14.5)

IR13CS0101 (02)
<0.045 (11.9)

IR13GB020 (93)
<0.09 (2.5)
<0.09 (5.5)
1.9J (8.5)
<0.23 (8.5)
<0.11 (11.5)
<0.1 (13)
<0.11 (15.5)
<0.12 (17.5)
<0.16 (17.5)
<0.13 (19.5)
<0.12 (22)

IR13CS0102 (02)
<0.046 (11.9)

IR13-SB05 (91)
0.26 (13)
<0.24 (14)

IR13CS0103 (02)
0.12= (11.9)

IR13GB013 (93)
0.41 (18.5)

IR13CS0105 (02)
0.062= (9)
<0.04 (16.5)

IR13GB009 (93)
<0.09 (1.5)
<0.09 (5.5)
<0.09 (8.5)
<0.041 (11)
<0.1 (11)
<0.1 (15)

IR13GB067 (96)
<0.018 (2)
0.11 (5)
0.019J (7)
0.01J (10)

IR13GB037 (94)
<0.09 (2.5)
<0.041 (2.5)
<0.08 (5.5)
<0.09 (8.5)
<0.11 (14.5)
<0.09 (17.5)

IR13GB039 (94)
<0.1 (2.5)
<0.08 (5.5)
<0.11 (8.5)
<0.09 (11.5)
<0.039 (13.25)
<0.1 (13.25)
<0.1 (17)

IR13CS0106 (02)
<0.041 (16)

IR13CS052 (99)
0.076 (4)

IR13CS054 (99)
0.056 (4)

IR13GB069 (96)
0.024 (2)
0.52 (5)
0.25J (7)
0.37 (10)

IR13GB070 (96)
0.091 (2)
2.2 (5)
<0.019 (7)
0.12 (10)

IR13CS002 (97)
0.1 (2.5)
<0.02 (2.5)

IR13GB072 (96)
<0.019 (2)
<0.019 (5)
0.025 (7)
<0.019 (10)

IR13GB038 (94)
<0.09 (2.5)
<0.09 (4.25)
<0.037 (4.25)
<0.1 (8.5)
<0.09 (11.5)
<0.1 (14)

IR13CS0104 (02)
<0.038 (9)
<0.05 (16)

IR13CS020 (97)
<0.02 (6)

IR13CS030 (98)
<0.043 (14.5)

IR13CS023 (98)
0.072 (6)

IR13GB021 (93)
0.06J (2.5)
<0.08 (5.5)
<0.09 (8.5)
<0.1 (11.5)

IR13CS053 (99)
0.046 (4)
0.072 (8)

IR13CS055 (99)
0.12 (4)
0.29 (8)

IR13GB065 (96)
<0.02 (10)

IR13GB014 (93)
0.2 (8)
<0.13 (10)
<0.12 (11.5)
<0.1 (14)
<0.09 (19.5)

IR13CS019 (97)
<0.02 (3.5)

IR13SS002 (96)
0.15 (10)

IR13GB066 (96)
0.48 (10)

IR13CS024 (98)
0.033 (5.5)

IR13GB005 (93)
<0.04 (11)
0.1J (13.5)

IR13GB033 (94)
0.13J (2.5)
<0.09 (6.2)
<0.036 (6.2)
<0.1 (8.5)
<0.13 (11.5)
<0.12 (14.5)

IR13GB030 (93)
<0.09 (2.5)
<0.09 (5.5)
<0.08 (8.5)
<0.08 (11.5)
<0.12 (14.5)

IR13GB032 (94)
<0.08 (2.5)
<0.1 (5.5)
<0.09 (8.5)
<0.12 (11.5)
<0.13 (14.5)

IR13CS017 (97)
0.12 (7)

IR13CS018 (97)
<0.02 (3)

IR13GB015 (93)
<0.08 (13)

IR13GB064 (96)
0.055 (10)

IR13GB061 (96)
0.039 (10)

IR13GB060 (96)
0.41 (10)

IR13GB073 (96)
<0.021 (2.5)
<0.018 (5)
0.026 (7)
<0.02 (10)

IR13CS028 (98)
<0.029 (3.5)

IR13GB063 (96)
0.0057J (7)
0.035 (10)

IR13CS025 (98)
<0.019 (2.5)
<0.02 (4.5)

IR13CS022 (97)
<0.019 (6)

IR13GB016 (93)
<0.09 (9)
<0.09 (13.5)

IR13SS001 (96)
0.25 (10)

IR13CS012 (97)
2.9 (10)

IR13GB040 (94)
<0.1 (2.5)
<0.08 (5.5)
<0.11 (8.5)
<0.09 (11.5)
<0.09 (14.5)

IR13CS016 (97)
0.11 (7)

IR13GB062 (96)
0.026J (10)

REMOVED CINDER
BLOCK WALLS

REMOVED CINDER
BLOCK WALLS

STORM DRAIN

FORMER ELECTRICAL
SUBSTATION AREA

IR13GB035 (94)
<0.08 (2.5)
0.04J (4.7)
<0.038 (4.7)
<0.08 (8.5)
<0.11 (11.5)
<0.12 (14.5)

IR13GB034 (94)
<0.038 (2.5)
<0.08 (2.5)
<0.09 (2.5)
<0.08 (5.25)
<0.038 (5.25)
<0.08 (9)
<0.12 (11.5)
<0.11 (14.5)

IR13GB051 (94)
<0.08 (2.5)
<0.1 (5.5)
<0.08 (8.5)
<0.11 (11.5)
<0.12 (14.5)

IR13GB043 (94)
<0.09 (2.5)
<0.09 (5.5)
<0.044 (8.25)
<0.11 (8.25)
<0.12 (11.5)
<0.13 (14.5)

IR13GB022 (93)
0.07J (2.5)
<0.09 (5)
<0.09 (9)
0.078 (10.5)
<0.09 (10.5)
<0.1 (13.5)

IR13CS003 (97)
0.29 (2.5)
0.88 (2.5)

IR13CB005 (94)
<0.039 (0.5)
<0.09 (0.5)
<0.09 (3.5)
<0.09 (6.5)
<0.08 (9.5)

IR13CB004 (94)
0.28 (0.5)
<0.1 (2.75)

IR13GB036 (94)
<0.09 (2.5)
<0.038 (4.75)
<0.09 (5)
<0.1 (8.5)
<0.1 (11.5)
<0.09 (14.5)

ELECTRICAL
UTILITY VAULT

STORM DRAIN

433

IR13GB052 (94)
<0.09 (2.5)
<0.09 (5.5)
0.11 (8.5)
<0.13 (11.5)

IR13GB044 (94)
<0.08 (2.5)
<0.04 (4.5)
<0.08 (4.5)
0.29J (8.5)
<0.12 (11.5)
<0.14 (14.5)

IR13GB045 (94)
<0.09 (2.5)
<0.08 (5.5)
<0.09 (8.5)
<0.11 (12)
<0.12 (14.5)

IR13GB046 (94)
0.42 (1.5)
<0.08 (1.5)
<0.09 (5.5)
<0.08 (8.5)
<0.1 (11.5)
<0.09 (15)

REMOVED CONCRETE
TRENCH AND SUMP

IR13GB041 (94)
<0.09 (3)
<0.1 (5.5)
<0.08 (8.5)
<0.09 (11.5)
<0.09 (13)

STORM DRAIN

LEGEND

- UNDERGROUND STORAGE TANK
- COMPOSITE SAMPLE
- GEOPROBE
- MONITORING WELL
- SOIL BORING
- SURFACE SOIL SAMPLE
- VACUUM EXCAVATION
- INVESTIGATION AREA
- ROADS
- INDUSTRIAL WASTEWATER PIPELINE
- RAILROAD
- FENCES

UTILITIES

- UNDERGROUND ELECTRICAL LINES

PIPELINES

- SALTWATER PIPELINES
- OTHER WATER PIPELINES
- STORMWATER PIPELINES
- STEAM PIPELINES
- GAS PIPELINES
- AIR PIPELINES
- COMPRESSED AIR PIPELINES
- BACKBONE SEWER PIPELINES
- SEWER SERVICE LINES
- REMOVED FUEL OIL PIPELINES
- EXISTING DREDGE PIPELINES
- ABANDONED DREDGE PIPELINES

- APPROXIMATE AREA OF 1995 REMOVAL ACTION
- APPROXIMATE AREA OF 1997 REMOVAL ACTION
- APPROXIMATE AREA OF 1999 REMOVAL ACTION
- GROUP 1 SITES
- STRUCTURES

SAMPLE LOCATION — IR10GB060 (94)
CONCENTRATION (mg/kg) — 47F (5.5)
SAMPLE BEGINING DEPTH (ft BGS)
SAMPLE COLLECTION YEAR

NOTES:
1. < = NOT DETECTED AT OR ABOVE THE INDICATED CONCENTRATION
2. F = ANALYSIS PERFORMED IN THE FIELD
3. J = ESTIMATED DETECTED RESULT
4. Y = FUEL PATTERN (TPH ONLY)
5. Z = NOT A FUEL PATTERN (TPH ONLY)
6. MEDIUM GRAY SYMBOL = SAMPLE(S) ANALYZED FOR PRESENTED CONSTITUENT(S)
7. LIGHT GRAY SYMBOL = OTHER SOIL SAMPLE LOCATIONS

N

0 13 26 Feet

**FIGURE 3-3**
**IR13 AROCLOR-1260 CONCENTRATIONS IN SOIL**
INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

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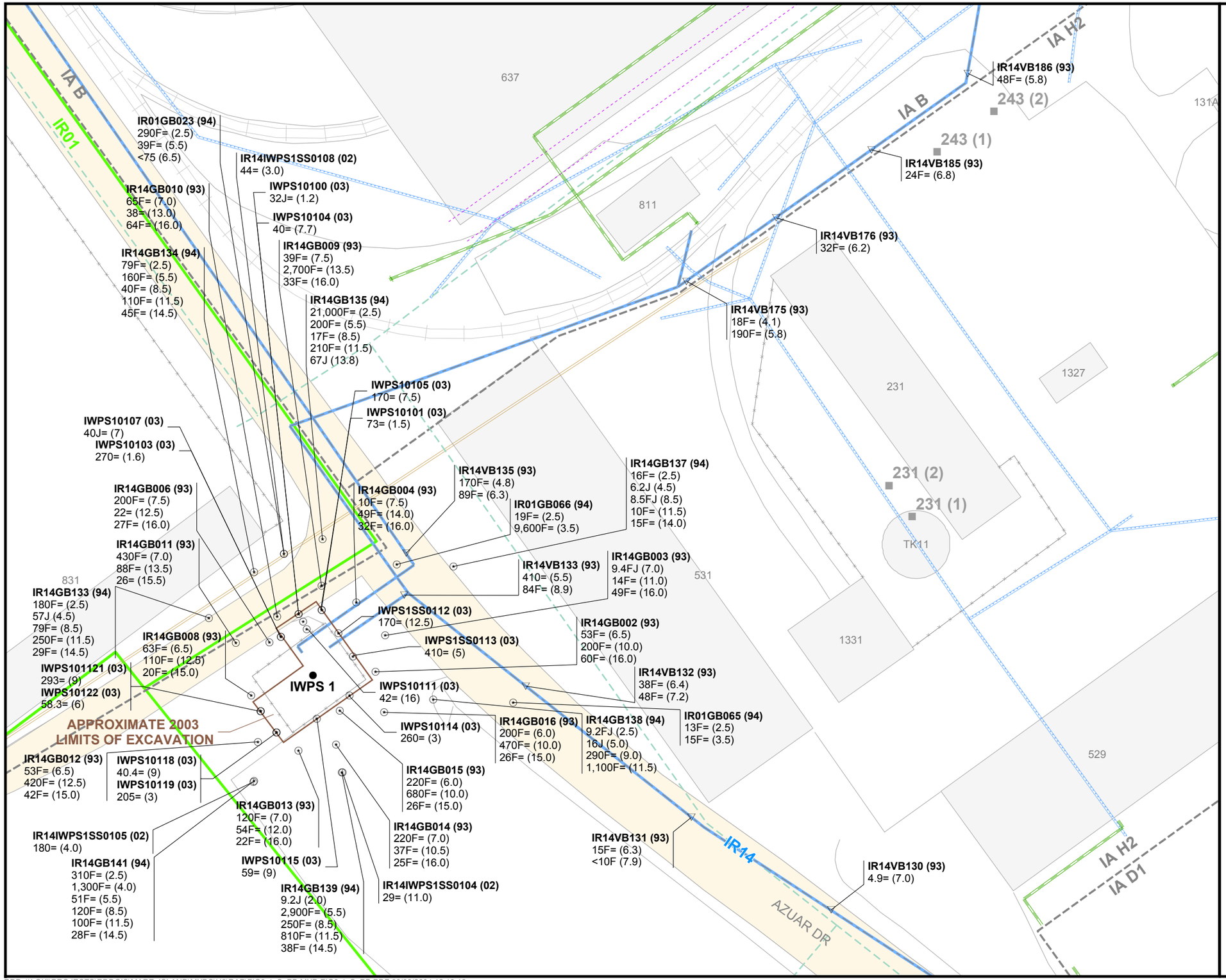
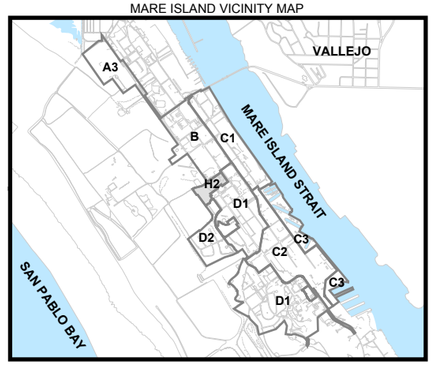



MARE ISLAND VICINITY MAP




**LEGEND**

- GEOPROBE SAMPLE
- MONITORING WELL
- SOIL BORING SAMPLE
- SURFACE SOIL SAMPLE
- VACUUM EXCAVATION SAMPLE
- PUMP STATIONS
- INVESTIGATION AREA
- FENCES
- RAILROADS
- EXISTING DREDGE PIPELINES
- GAS PIPELINES
- INDUSTRIAL WASTEWATER PIPELINE
- OTHER WATER PIPELINES
- STEAM PIPELINES
- STORMWATER PIPELINES
- GROUP I SITES
- ROADS
- STRUCTURES

SAMPLE LOCATION
CONCENTRATION (mg/kg)
SAMPLE BEGINNING DEPTH (ft BGS)
SAMPLE COLLECTION YEAR

IR14VB219 (93)
86FJ (2.8)

NOTES:
1. < = NOT DETECTED AT OR ABOVE THE INDICATED CONCENTRATION
2. F = ANALYSIS PERFORMED BY XRF
3. = = ANALYTE WAS DETECTED
4. J = ESTIMATED DETECTED RESULT

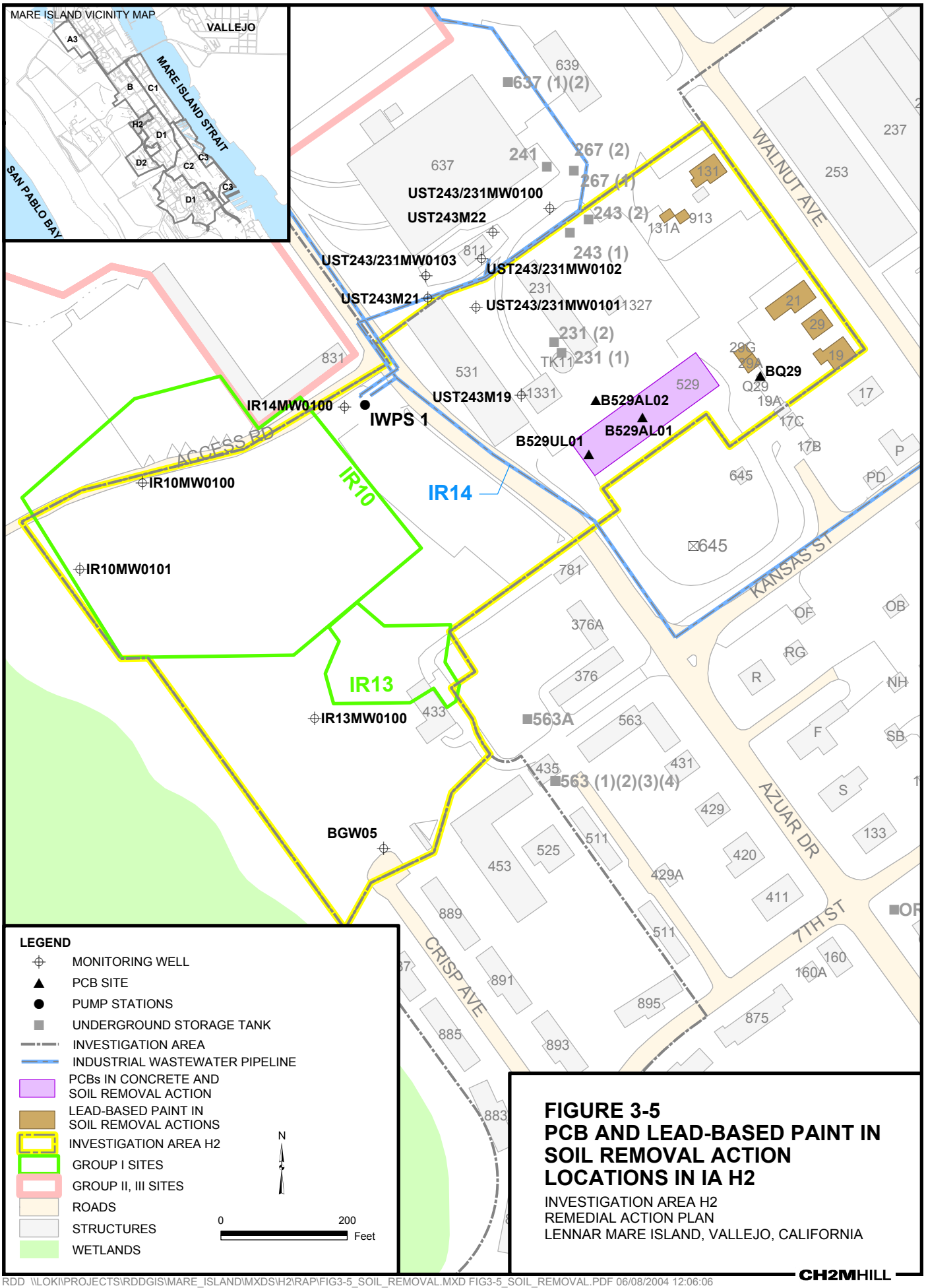
0 50 Feet

N

**FIGURE 3-4**
**IR14 - IWPS. NO. 1 AREA**
**LEAD CONCENTRATIONS IN SOIL**
INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\MARE_ISLAND\MXDS\H2\RAP\FIG3-4_S_PB.MXD FIG3-4_S_PB.PDF 06/08/2004 12:10:16




# FIGURE 3-5
# PCB AND LEAD-BASED PAINT IN SOIL REMOVAL ACTION LOCATIONS IN IA H2

INVESTIGATION AREA H2
REMEDIAL ACTION PLAN
LENNAR MARE ISLAND, VALLEJO, CALIFORNIA

CH2MHILL

# 4.0 Remedial Action Objectives

This section presents remedial action objectives (RAOs) for cleanup of contamination within IA H2. The RAOs for the site include:

- Protecting human health from exposure to constituents in soil that present a potential risk greater than the risk-management range. This is achieved if potential site risks fall within a range of excess lifetime cancer risk of $10^{-4}$ to $10^{-6}$, below a non-cancer hazard quotient of 1, and estimated blood lead concentrations fall below 10 µg/dL.
- Protecting ecological receptors from unacceptable exposure to site-related constituents.
- Restoring soils to a condition compatible with planned recreational/residential land use.

# 5.0 Remedial Alternatives and Recommended Remedial Action

The sites and environmental issues in IA H2 that have been identified and evaluated include:

- Three IRP sites (IR10, IR13, and a portion of IR14).
- Four PCB sites.
- Underground Storage Tank Program Sites.
- Unexploded Ordnance Program.
- Radiological Decommissioning Program.
- Abrasive Blast Material.
- LBP in soil around existing structures built before 1978.

Several of the sites and environmental issues in IA H2 listed above have been resolved such that no further action is required for unrestricted use. These sites are summarized in Section 5.1. The sites that require further action are discussed in Section 5.2, along with the remedy recommended for each of the sites.

## 5.1 No Action Determinations

### 5.1.1 PCB Sites

No release to the environment has occurred at PCB sites Building 529 UL#01 and Building Q29 AL#01, and the sites are suitable for unrestricted use (DTSC 2003a; USEPA 2003a, 2004a; DTSC 2003b).

### 5.1.2 Unexploded Ordnance

The Navy addressed the nature and extent of potential unexploded ordnance contamination at the former MINS, and the supplemental environmental baseline surveys indicated that no existing ordnance concerns exist within IA H2. Neither live explosive ordnance nor ordnance ingredients were manufactured in any of the buildings or the surrounding area within IA H2. Additionally, none of the old rifle or firing ranges are located within IA H2 (PRC 1995a).

### 5.1.3 Radiological

The Navy conducted comprehensive surveys of buildings and facilities in IA H2 under the radiological program. Abatement activities (removal of contaminated materials) were performed as necessary, both inside and outside of IA H2 buildings. DTSC and USEPA

agreed that no further investigation or response is necessary to address the areas of past radiological material use in IA H2 (DTSC 1996, 1997; USEPA 1996; MINS 1996a, 1997a).

### 5.1.4 Abrasive Blast Material

Abrasive blast material (ABM) was used periodically across Mare Island for utility pipeline bedding material and as excavation backfill. There are no remaining documented locations of spent ABM disposal within IA H2.

These sites have been investigated, and environmental issues have been resolved to a level such that they no longer represent a significant risk to human health or the environment for the planned land use.

## 5.2 Alternatives and Proposed Remedy for Sites that Require Further Action

### 5.2.1 IR10 and IR13—Land-use Covenant

Removal actions performed at IR10 and IR13 have mitigated releases that have occurred at the sites. The *Final Investigation Area H2 Remedial Investigation Report* (CH2M HILL 2003a) demonstrates that the existing level of constituents following the removal actions are appropriate for the intended land use. As a result, the RAOs presented in Section 4.0 for both IR sites have been met, and no further physical remedial activities are warranted at the sites. Because concentrations of lead, PCBs, and/or PAHs exist at the sites above levels consistent with unrestricted use, the remedy for the sites should include the recordation of a land-use covenant that restricts activities at IR10 and IR13 to those consistent with the recreational land use by prohibiting the following sensitive uses: residential, schools for persons under 18 years, hospitals, and day-care centers.

The land-use covenant will be recorded with the County of Solano, will define the area subject to the environmental restriction, and will include provisions for enforcement. The land-use covenant will specifically: (1) define the sites and state historical uses of the sites; (2) state the remaining concentrations of lead, PCBs, and/or PAHs remaining at each site; and (3) prohibit sensitive uses as described above. The land-use covenant will also include requirements for proper management of soil having contaminants at concentrations that exceed those appropriate for unrestricted use, as well as requirements for periodic reporting, enforcement of restrictions, and reimbursement of DTSC costs associated with the administration of the restrictions. LMI will develop a land use restriction implementation and enforcement plan, approved by DTSC, prior to execution of the land-use covenant and certification by DTSC. Following agency review and approval of site closure with a land-use covenant, the restriction will be recorded by LMI, and a copy of the final recorded land-use covenant will be provided, along with certification of recordation in Solano County. The land-use covenant will be pursuant to Section 67391.1 to Title 22, Division 4.5, Chapter 39 of the California Code of Regulations, executed by DTSC and LMI, and recorded in Solano County. This land-use covenant will run with the land and be enforceable by DTSC. USEPA will be a third-party beneficiary with respect to PCB issues.

### 5.2.2 IR14 in IA H2—Sample and Potentially Remove Solids

The portion of IR14 within IA H2 has been investigated and remediated and is not considered to represent a significant risk to human health or the environment. The removal action performed at IR14 and IWPS No.1 within IA H2 has mitigated releases that have occurred at the site. As a result, the RAOs presented in Section 4.0 for the site have been met, with the exception of the potential flushing of the pipeline discussed below.

DTSC has identified the industrial wastewater pipeline as an interim status unit under RCRA because of its appurtenance to the IWTP. In order to satisfy RCRA requirements, the pipeline within IA H2 was inspected in April 2004 to determine if waste remains in place. The pipeline was also inspected for major breaks in the line that may have caused release of industrial waste during operation of the system to the surrounding soils. Inspection of the pipeline by video survey revealed that the pipeline was intact and in good condition. No breaks were observed; however, solids were found intermittently in the pipeline. Therefore, the solids will be sampled and additional flushing of the line will be performed, if necessary, to remove residual solids from the pipeline to comply with the requirements of RCRA.

### 5.2.3 Lead-based Paint in Soil—Soil Removal

LBP in soil is a common environmental issue associated with buildings built before 1978. The LBP around structures in IA H2 will be remediated through surface soil removal.

As discussed in Section 3.2.8, additional characterization was performed for Buildings 19, 21, 29, 29A, 29G, 131, 131A, and 913, which lie in an area planned for residential use. Composite samples were collected along the drip lines of each building (approximately 10 to 12 inches away from the edge of the building), and discrete surface soil samples were collected in the mid-yard areas. The analytical results of the characterization samples were compared to residential risk-based levels according to the conditions discussed in Section 3.2.8 to determine sites which required remediation for LBP in soil. Based on this comparison, it was determined that the lead concentrations in soil surrounding all of the buildings were above risk-based levels; therefore, remediation of LBP in soil will be performed at all of these buildings.

Excavation is a common and well-proven method of removing contaminated surface and subsurface materials from contaminated sites. Soil removal followed by soil verification sampling will occur along the drip-line and/or mid-yard area to 0.5 to 1 foot bgs. Excavated soil will be transported by truck to a permitted landfill for burial. Prior to loading for transport, the soil will be stockpiled and characterized to determine if treatment is required prior to disposal. Soil that is removed for disposal will be handled according to the *Soil and Groundwater Management Plan* (CH2M HILL 2001). Following any soil excavation, verification soil samples will be collected and submitted for laboratory analysis for lead to ensure the effectiveness of the removal action. Soil verification samples will be evaluated against the residential risk-based level (210 mg/kg). The total number of verification soil samples collected at each site will be determined by the size of the excavation area. Verification samples will be collected in a systematic grid pattern and will consist of discrete samples for small excavation areas and composite samples (maximum of four samples per composite) for larger excavation areas. The results of the verification samples will be

compared to the residential risk-based level to determine if additional excavation is required or if the results indicate that NFA is required at that structure.

### 5.2.4 Building 529 PCB Sites—Concrete and Soil Removal

Excavation is a common and well-proven method of removing contaminated surface and subsurface materials from a site. Additional concrete and soil removal will occur at Building 529 AL#01 and AL#02 to remove the elevated PCB concentrations remaining at the site. Two large areas of concrete will be removed and soils under the expansion joints and cracked areas of the concrete floor will be removed to 1 foot bgs. Removed materials will be transported by truck to a permitted landfill for disposal. Prior to loading for transport, the removed materials will be stockpiled and characterized to determine if treatment is required prior to disposal. Soil that is removed for disposal will be handled according to the *Final Soil and Groundwater Management Plan* (CH2M HILL 2001). After removal of the concrete floor and underlying soil, 50 verification samples will be collected in a systematic grid pattern. The results of the verification samples will be compared to the residential PRG for unrestricted use (0.22 mg/kg) to determine if additional excavation is required or if the results indicate that no further action is required at Building 529.

## 5.3 Summary

The sites and environmental issues in IA H2 have been investigated and considered not to represent a significant risk to human health or the environment, have planned remedial actions as specified in this RAP, or have been resolved to a level such that IA H2 no longer represents a significant risk to human health or the environment for the planned land use.

Following implementation of the remedies as presented above, an implementation report will be prepared for IA H2. The implementation report will provide the documentation that the remedies specified in this RAP, including the land-use covenants, have been implemented. Upon review and approval of the implementation report, and any required public notices, DTSC will issue certification for IA H2.

In addition to implementation of this RAP for PCB and UST sites pursuant to Chapter 6.5 and 6.8 of Division 20 of the Health and Safety Code, the PCB and UST sites are being evaluated under the oversight of USEPA (for the PCB sites) and the RWQCB (for the UST sites), in accordance with the respective orders. Consistent with the Consent Agreement, the completion of all removal actions at UST sites under the review of the RWQCB, as well as submittal of the reports concluding that NFA is required at each of the sites will be reviewed by DTSC. DTSC will continue to work with the RWQCB to assure that the removal actions are consistent with the requirements of RCRA Corrective Action. All determinations at the PCB sites will be reviewed by USEPA to ensure consistency with Federal requirements. DTSC will review these determinations prior to issuance of certification and RCRA Corrective Action termination for IA H2.

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APPENDIX A

# Response to Comments on the Draft Investigation Area H2 Remedial Action Plan

Provided in the table below are the responses to comments on the Draft Investigation Area H2 Remedial Action Plan.

**TABLE 1**
Response to Comments on the Draft Investigation Area H2 Remedial Action Plan

| Comment From and Date | Comment | Response |
|---|---|---|
| DTSC<br>March 12, 2004 | 1) The draft IA H2 RAP stated in several locations that this would be a no further action (NFA) determination RAP. This is incorrect since institution controls will be necessary due to wastes left in place above unrestricted use and an industrial/commercial deed restriction will be required at several locations. Please remove all of the NFA reference determination throughout the RAP. | The draft final IA H2 RAP has been revised such that the NFA determination is only used for sites which are suitable for unrestricted use. The implementation of institutional controls is considered a remedy. |
| DTSC<br>March 12, 2004 | 2) IR14 industrial wastewater pipeline - as mentioned in previous meetings, additional investigation or remedial work is required to determine if waste is left in place inside the pipeline. Please update this section to include the IR14 additional investigation and necessary cleanup work. | The sections of the draft final IA H2 RAP which refer to IR14 include the results of the video survey performed for the pipeline in April 2004. The pipeline was found to be intact, in good condition, and no breaks were observed, however, residual solids were found intermittently in the pipeline. Therefore, additional flushing of the pipeline will be performed to remove the residual solids. |
| DTSC<br>March 12, 2004 | 3) Lead-based Paint - there are number of lead-based paint (LBP) sites that have not been characterized yet. These sites must be investigated and cleanup prior to any residential occupancy. The RAP must identify each LBP site and proposed remedial actions for each of these sites and use restrictions. | The draft final IA H2 RAP includes a summary of the analytical results collected from the characterization of soil surrounding LBP sites which was performed in April 2004. The results of the characterization determined that all of the sites characterized require remediation for lead in soil from LBP. The proposed remedial actions for each of the sites are included in Section 5.2. |
| DTSC<br>March 12, 2004 | 4) Please provide a map designating which areas are proposed for industrial use restriction versus unrestricted use. A table should also be included with reference to why the industrial use designation. For example, TPH, LBP, or PCB exceeded the residential PRGs. | Figure 3-1 was modified to include the planned land use for each site within IA H2. The text of the draft final IA H2 RAP includes an explanation of why the recreational use designation is required for IR10 and IR13. No industrial use designations are required for sites within IA H2. |
| RWQCB<br>April 28, 2004 | 1) Water Board staff have reviewed the Draft Investigation Area H2 Remedial Action Plan (RAP), received December 11, 2003, and prepared by CH2M HILL on behalf of Lennar Mare Island. This report summarizes environmental investigations, and past and proposed remedial actions, for IA H2, located in the central portion of Mare Island. Water Board staff agree with the summary information presented in the report that pertains to the | No response required. |

**TABLE 1**
Response to Comments on the Draft Investigation Area H2 Remedial Action Plan

| Comment From and Date | Comment | Response |
|---|---|---|
| | underground storage tank (UST) and a fuel oil pipeline (FOPL) programs. These programs are being implemented by Lennar Mare Island to comply with specific tasks presented in Water Board Order R2-2002-0105. Lennar Mare Island will request closure for petroleum related sites under separate cover. Water Board staff find this summary report acceptable and have no comments. | |

APPENDIX B

# Response to Public Comments on the Draft Final Investigation Area H2 Remedial Action Plan

Provided in the table below are the responses to public comments on the Draft Final Investigation Area H2 Remedial Action Plan.

**TABLE 1**
Response to Public Comments on the Draft Final Investigation Area H2 Remedial Action Plan

| Comment From and Date | Comment | Response |
|---|---|---|
| Diana Krevsky<br>June 24, 2004 | 1) Ms. Krevsky inquired which areas within Investigation Area H2 were planned for residential use. | Figure 3-1 of the Draft Final Investigation Area H2 Remedial Action Plan presents the planned land uses for all of Investigation Area H2. |
| Myrna Hayes<br>June 24, 2004 | 2) Ms. Hayes asked for clarification of why the fact sheet states that there are no remaining negative or harmful impacts to soil or groundwater at IR14 in Investigation Area H2 and that the site is appropriate for its planned residential use, however, that the only cleanup action required for the site is to sample the solids and determine if they are hazardous. | The soil and groundwater data collected as part of the IR14 investigation indicated that the only cleanup action required for IR14 was around Pump Station 1. Upon completion of this action, the soil and groundwater surrounding IR14 are appropriate for residential use. DTSC subsequently requested that the pipeline itself be inspected to determine if waste remained inside the pipeline. Based on the inspection, intermittent solids were found inside the pipeline, therefore, a cleanup action was determined to be necessary for the material inside the pipeline. This cleanup action is necessary based on the requirement from DTSC to remove waste remaining in place, which is in addition to the successful completion of the cleanup action for soil and groundwater around Pump Station 1. |
| Myrna Hayes<br>June 24, 2004 | 3) Ms. Hayes inquired what the remaining concentrations of PCBs are at IR13. | The Navy performed excavation at IR13 pursuant to the Navy work plan entitled *Addendum to the Removal Work Plan, Extension of Removal Action, IR13* (October 19, 1998). Because the excavation remained open when the land transferred to Lennar, CH2M HILL completed the excavation in accordance with the Navy work plan which had undergone a public review process. The cleanup goal approved in this work plan by DTSC was 1 mg/kg.<br><br>Therefore, all soil remaining in the open excavation which was above the cleanup goal of 1 mg/kg was removed during the removal action performed in 2002/2003 to depths between 16 and 24 feet below ground surface. The highest remaining concentration in the area of the previous open excavation is 0.68 mg/kg at a depth of 12 feet below ground surface. South of the previously open excavation, in the area of the site which was previously excavated and backfilled by the Navy, the maximum concentration is 2.9 mg/kg at a depth of |

**TABLE 1**
Response to Public Comments on the Draft Final Investigation Area H2 Remedial Action Plan

| Comment From and Date | Comment | Response |
|---|---|---|
| | | 10 feet below ground surface. Both of these areas were backfilled with clean soil, therefore, the risk of potential exposure to receptors to PCB concentrations at these depths is limited. All PCB concentrations remaining at the site are shown on Figure 3-3 of the Draft Final Investigation Area H2 Remedial Action Plan. |
| Diana Krevsky<br>June 24, 2004 | 4) Ms. Krevsky commented that the fact sheet and public meeting presentation should include the cleanup goals for the proposed actions and the regulatory standards which are the basis for the cleanup goals. | Cleanup goals for proposed actions will be included in future fact sheets and public meeting presentations. For the proposed cleanup actions in Investigation Area H2, 0.22 mg/kg is the cleanup goal for the PCB soil removal action (based on the residential preliminary remediation goal (PRG)) and the cleanup goal for the lead based paint soil removal actions is 210 mg/kg (based on the Lead Spread 7 model). Both of these cleanup goals are discussed in the Draft Final Investigation Area H2 Remedial Action Plan. |
| Myrna Hayes<br>June 24, 2004 | 5) Ms. Hayes inquired why IR13 was not cleaned up to a residential level and what the difference would have been to clean up the site to unrestricted residential use levels. She expressed concern about the effectiveness of land use restrictions. | The cleanup of IR13 has been conducted to be consistent with the intended future recreational land use. Several soil concentrations remain at the site above the residential PRG (Figure 3-3), but have been shown through risk assessment to be appropriate for the planned recreational use. In this case, the additional cost of further cleanup of the site to a residential standard is not warranted because additional protection is not required based on the planned land use.<br>To ensure that the land use remains recreational, a land use covenant is also required as part of the remedy. The land use covenant will prohibit sensitive uses (including residential use), and will be attached to the deed in perpetuity. The land use covenant will be enforced by regulatory agencies. Lennar will also inform the new land owner of the nature of the restrictions on the property. |
| Myrna Hayes<br>June 24, 2004 | 6) Ms. Hayes asked for a comparison between the regulatory residential level and the recreational level for PCBs. | The residential PRG is 0.22 mg/kg. The commercial PRG was lowered from 1 mg/kg to 0.74 mg/kg in October 2002. There is no agency promulgated recreational PRG. After soil at IR13 above the cleanup goal was excavated, a risk assessment was performed based on the recreational use intended for the site, with input from DTSC risk assessors, to calculate the potential risk to receptors at the site. This site-specific approach was necessary because there is no agency promulgated recreational PRG. |
| Jeff Morris<br>June 24, 2004 | 7) Mr. Morris inquired what the residual PCB concentration is at depth that remains at IR13. | The residual concentration at depth in the area of the previous open excavation is 0.68 mg/kg at a depth of 12 feet below ground surface. |